Synchronization patterns in neural networks

Department of Applied Mathematics and Computer Science

Dynamical Systems
Period: 20/05/2018 → ...
Number of participants: 1
Project participant:
Martens, Erik Andreas (Intern)

Vascular network dynamics

Department of Applied Mathematics and Computer Science

Dynamical Systems
Period: 20/05/2018 → ...
Number of participants: 1
Project participant:
Martens, Erik Andreas (Intern)

Smart Cities Accellerator
European Interreg Project with 6 municipality implementing the research findings of the CITIES project in cooperation with other universities in the area Copenhagen, Southern Sweden.

Centre for IT-Intelligent Energy Systems in Cities

Department of Civil Engineering
Department of Applied Mathematics and Computer Science

Department of Management Engineering
Period: 20/04/2018 → 20/07/2018
Number of participants: 3
Acronym: SCA
Project participant:
Heller, Alfred (Intern)
Nielsen, Per Sieverts (Intern)
Project Manager, academic:
Madsen, Henrik (Intern)

Design Toolbox for Personal Health Technology

Department of Applied Mathematics and Computer Science
Period: 01/02/2018 → 31/01/2021
Number of participants: 3
PhD Student:
Maharjan, Raju (Ekstern)
Supervisor:
Bækgaard, Per (Intern)
Main Supervisor:
Bardram, Jakob Eyvind (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Offentlig finansiering
Project: PhD
Leak detection in water supply pipes using drone-borne sensor technology
Identification of water leaks in distribution pipes with UAVs via microwave and thermal monitoring

Department of Environmental Engineering
Water Resources Engineering
National Space Institute
Geodesy
Department of Applied Mathematics and Computer Science
Image Analysis & Computer Graphics
Dronelnspektion ApS
Drone Systems ApS
Aarhus Water
Solrød Vandværk
HOFOR A/S

VandCenter Syd
Period: 16/11/2017 → 30/06/2018
Number of participants: 4
Project participant:
Bandini, Filippo (Intern)
Jakobsen, Jakob (Intern)
Bauer-Gottwein, Peter (Intern)
Frisvad, Jeppe Revall (Intern)

Democratizing energy markets through the introduction of innovative flexibility-based demand response tools and novel business and market models for energy cooperatives
FLEXCoop aims at introducing a complete automated Demand Response framework and tool suite for residential electricity consumers. The end-to-end interoperable solution will enable consumer flexibility to be valorised in front of a range of possible users in order to fulfill different services to the grid. This framework will enable energy cooperatives to explore demand response business models and take the role of aggregators. The pilot participants are members of two energy cooperatives located in the Netherlands and in Spain.

Department of Applied Mathematics and Computer Science
Dynamical Systems
Period: 01/10/2017 → 30/09/2019
Number of participants: 4
Acronym: FLEXCoop
Project participant:
Azar, Armin Ghasem (Intern)
Relan, Rishi (Intern)
Bacher, Peder (Intern)
Madsen, Henrik (Intern)

Effective, Co-created and compliant ACM
The goal of the EcoKnow project is to develop world-leading solutions for the effective digitalization of knowledge work processes that empower caseworkers and citizens to plan evidence-based optimal process flows for the individual case, guaranteeing both efficiency and compliance with the law. EcoKnow brings together knowledge from leading national and international researchers, municipalities, representatives for case workers, key industrial partners, digitalisation consultants and lawyers, researching and developing methods for co-creation technologies for real-time analysis of process logs (process mining) and adaptive case management through a multi-disciplinary situated design process.

Department of Applied Mathematics and Computer Science
Software Engineering
Period: 01/09/2017 → 31/08/2020
Number of participants: 3
Acronym: EcoKnow
Project participant:
Weber, Barbara (Intern)
Burattin, Andrea (Intern)
Abbad Andaloussi, Amine (Intern)

**Smart Innovation - Learningbank: Learning using VR**
Digital Learning
Department of Applied Mathematics and Computer Science
Statistics and Data Analysis

Learningbank
Period: 01/09/2017 → ...
Number of participants: 2
Project participant:
Thyregod, Camilla (Intern)

**Cyber Resilience for the Shipping industry**
The CyberShip project is aimed at providing shipping companies and regulators with a reference framework and decision support model to better cope with disruptions originating from a cyber-attack.
Department of Management Engineering
Management Science
Transport DTU
Operations Management
Department of Applied Mathematics and Computer Science
Cyber Security
Copenhagen Center for Health Technology
Period: 01/09/2017 → 31/08/2019
Number of participants: 4
Acronym: CyberShip
Project participant:
Psaraftis, Harilaos N. (Intern)
Jensen, Christian D. (Intern)
Sepúlveda Estay, Daniel Alberto (Intern)

**Explainability of uncertainty for neural networks**
Department of Applied Mathematics and Computer Science
Period: 01/09/2017 → 31/08/2020
Number of participants: 3
Phd Student:
Rieger, Laura (Ekstern)
Supervisor:
Nielsen, Finn Årup (Intern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU)
Project: PhD

Smart Manufacturing Frameworks
Department of Applied Mathematics and Computer Science
Period: 01/09/2017 → 01/12/2020
Number of participants: 3
Phd Student:
Maier, Dana (Intern)
Supervisor:
Larsen, Jakob Eg (Intern)
Main Supervisor:
Bærentzen, Jakob Andreas (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Industrial PhD
Project: PhD

Real-Time Multicore Systems
Department of Applied Mathematics and Computer Science
Period: 15/08/2017 → 14/08/2020
Number of participants: 3
Phd Student:
Baris, Oktay (Ekstern)
Supervisor:
Sparsø, Jens (Intern)
Main Supervisor:
Schoeberl, Martin (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Samfinansieret - Andet
Project: PhD

IEA Task Material and component development for thermal storage systems
The aims of the project are within the IEA (International Energy Agency) SHC (Solar Heating & Cooling) Programme Task project "Material and component development for thermal storage systems" to develop economically attractive compact long term heat storages and to elucidate the suitability of the heat storages for different applications. The project is the Danish part of the IEA Task project "Material and component development for thermal storage systems". Work will be carried out in the following fields: Component development Application areas Numerical simulation methods The expert meetings of the project will be attended so that knowledge on the results of the international partners is achieved. The Danish activities is focused on development of inexpensive compact heat storages based on salt hydrates, on optimization of energy systems based on these heat storages and on the interplay between the systems and the future energy system. In cooperation with interested companies development work is carried out. Among other things a heat storage module based on sodium acetate trihydrate from Nilan A/S will be investigated by means of experiments. Further, a combined solar heating/heat pump system with a PCM heat storage will be investigated.

Department of Civil Engineering
Section for Building Energy
Department of Applied Mathematics and Computer Science
Nilan A/S
Period: 01/01/2017 → 31/12/2019
Number of participants: 4
PCM heat storage, supercooling, applications
Project participant:
Furbo, Simon (Intern)
Englmair, Gerald (Intern)
Dannemand, Mark (Intern)
Kong, Weiqiang (Intern)

**Strengthen ISS Global A/S before negotiations through data analysis on Fleet LSI data**
Department of Applied Mathematics and Computer Science

Statistics and Data Analysis
Period: 01/01/2017 → 06/07/2017
Number of participants: 3
Other:
Samsøe, Pernille Lindvang (Ekstern)
Supervisor:
Thyregod, Camilla (Intern)
Main Supervisor:
Rootzén, Helle (Intern)

**Statistics and Data Analytics on Smart Zero**
Department of Applied Mathematics and Computer Science
Period: 15/09/2016 → 14/09/2019
Number of participants: 2
PhD Student:
Wolf, Sebastian (Ekstern)
Main Supervisor:
Madsen, Henrik (Intern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU)
Project: PhD

**Cool PVT**
The aim is to develop PVT panels which can be used for heat and electricity production during daytime and for cooling during night time.

Differently designed PVT panels will be tested experimentally in laboratory test facilities

Department of Civil Engineering
Section for Building Energy
Department of Applied Mathematics and Computer Science
RACELL SAPHIRE Technologies ApS
COWI A/S
Period: 01/09/2016 → 31/12/2016
Number of participants: 2
PVT panels, heating cooling
Project participant:
Furbo, Simon (Intern)
Dannemand, Mark (Intern)

**Human Behavior of Track Pilot**
Master Thesis Project
Department of Applied Mathematics and Computer Science
Multivariate Time Series Modelling of Australian Data on Deaths from Homicide and Suicides

Department of Applied Mathematics and Computer Science

Statistics and Data Analysis
Period: 22/08/2016 → 01/01/2017
Number of participants: 2
Time Series Analysis, Multivariate, MARIMA, Australia

Supervisor:
Spliid, Henrik (Intern)
Main Supervisor:
Stockmarr, Anders (Intern)

Project

NordSecMob Master's Programme in Security and Mobile Computing - 2 continuation

Department of Applied Mathematics and Computer Science

Embedded Systems Engineering

Aalto University
KTH - Royal Institute of Technology
Norwegian University of Science and Technology
University of Tartu

Period: 01/08/2016 → 31/07/2018
Number of participants: 1
Acronym: NordSecMob
Project participant:
Stassen, Flemming (Intern)

Project

SDE-modelling in CiTIES

Department of Applied Mathematics and Computer Science

Centre for IT-Intelligent Energy Systems in Cities

Period: 15/07/2016 → 13/11/2019
Number of participants: 4
Phd Student:
Junker, Rune Grønborg (Intern)
Supervisor:
Jørgensen, John Bagterp (Intern)
Thygesen, Uffe Høgsbro (Intern)
Main Supervisor:
Madsen, Henrik (Intern)

Financing sources
Source: Internal funding (public)
Characterizing Porous Tool Materials for Impulse Drying Technology

Department of Applied Mathematics and Computer Science
Department of Mechanical Engineering
Manufacturing Engineering
Period: 01/06/2016 → 01/07/2017
Number of participants: 1
Project participant:
Stolfi, Alessandro (Intern)

GÉANT Project

The GÉANT project is a truly Pan-European collaboration between 41 National Research and Education Networks and their joint organisations NORDUnet and GÉAN, placing Europe at the forefront of high performance networking and AAI.

Department of Applied Mathematics and Computer Science
Algorithms and Logic
Period: 01/05/2016 → 31/12/2018
Number of participants: 1
High speed networking
Acronym: GN4-2
Project participant:
Olesen, Dorte (Intern)

PVT/heat pump system

Measurements on a PVT/heat pump system are carried out in a laboratory test facility.

Department of Civil Engineering
Section for Building Energy
Department of Applied Mathematics and Computer Science
RACELL SAPHIRE Technologies ApS
COWI A/S
Period: 01/04/2016 → 31/07/2017
Number of participants: 3
PVT panels, heat pump, measurements
Project participant:
Furbo, Simon (Intern)
Dannemand, Mark (Intern)
Perers, Bengt (Intern)

Visualization, Analysis and Modelling of On-street Parking Data

Master project
Department of Applied Mathematics and Computer Science
Statistics and Data Analysis
EasyPark
Period: 01/04/2016 → 28/09/2016
Number of participants: 3
Project participant:
Notarangelo, Rosaria (Ekstern)
Supervisor:
Reducing the rate and duration of re-admission among patients with unipolar and bipolar disorder using smartphone-based monitoring and treatment

According to WHO, depression is becoming a leading cause of disability. The RADMIS project seeks to design smartphone-based monitoring and treatment technology for depressive patients. The goal is to establish the efficacy of this technology by measuring re-admission and clinical outcome.

Copenhagen Center for Health Technology
Department of Applied Mathematics and Computer Science
Embedded Systems Engineering
Cognitive Systems
Psychiatric Center Copenhagen, Rigshospitalet
Period: 01/03/2016 → 01/09/2019
Number of participants: 2
Acronym: RADMIS
Number of related Ph.D. students: 2
Project participant:
Bardram, Jakob Eyvind (Intern)
Winther, Ole (Intern)

Financing sources
Source: Public research programme (public)
Name of research programme: Innovation Fund Denmark
Web address: http://innovationsfonden.dk/en
Amount: 11,000,000.00 Danish Kroner
Year of approval: 2016

3D imaging center

Department of Physics
Neutrons and X-rays for Materials Physics
Department of Applied Mathematics and Computer Science
Image Analysis & Computer Graphics
Department of Energy Conversion and Storage
Imaging and Structural Analysis
Electrofunctional materials
Centre for oil and gas – DTU
Period: 01/01/2016 → 01/01/2021
Number of participants: 14
Project participant:
Dahl, Anders Bjorholm (Intern)
Oddershede, Jette (Intern)
Trinderup, Camilla Himmelstrup (Intern)
Simonsen, Søren Bredmose (Intern)
Zheng, Yi (Intern)
Brink, Bastian (Intern)
Lauridsen, Torsten (Ekstern)
Thydén, Karl Tor Sune (Intern)
Sanna, Simone (Intern)
Relations
Related projects:
Alliance for Imaging and Modelling of Energy Applications
Publications:
From concept to in vivo testing: Microcontainers for oral drug delivery
Scene reassembly after multimodal digitization and pipeline evaluation using photorealistic rendering
Graphite nodules in fatigue-tested cast iron characterized in 2D and 3D
In-Situ X-ray Tomography Study of Cement Exposed to CO$_2$ Saturated Brine
Crack Tip Flipping under Mode I Tearing: Investigated by X-Ray Tomography
Powder embossing method for selective loading of polymeric microcontainers with drug formulation
High-Performance Microchanneled Asymmetric Gd$_{0.1}$Ce$_{0.9}$O$_{1.95-\delta}$-La$_{0.6}$Sr$_{0.4}$FeO$_{3-\delta}$-Based Membranes for Oxygen Separation
Characterization of graphite nodules in thick-walled ductile cast iron
Surface Detection using Round Cut
Microstructure and micromechanics of the heart urchin test from X-ray tomography
Synthesis and characterization of Fe–Ni/γ-Al$_2$O$_3$ egg-shell catalyst for H$_2$ generation by ammonia decomposition

Smart TSO-DSO Interaction schemes, market architectures and ICT Solutions for the integration of ancillary services from demand side management and distributed generation
The project SmartNet aims at providing architectures for optimized interaction between TSOs and DSOs in managing the exchange of information for monitoring and for the acquisition of ancillary services (reserve and balancing, voltage regulation, congestion management) both at national level and in a cross-border context. Local needs for ancillary services in distribution systems are supposed to co-exist with system needs for balancing and congestion management. Resources located in distribution systems, like demand side management and distributed generation, are supposed to participate to the provision of ancillary services both locally and for the system in the context of competitive ancillary services markets.

Department of Applied Mathematics and Computer Science

Optimisation of biodevice production
Master project
Department of Applied Mathematics and Computer Science

Statistics and Data Analysis
Scandinavian Micro Biodevice ApS
Period: 01/01/2016 → 04/06/2016
Number of participants: 3
Project participant:
Rabøl, Mads Peter (Ekstern)
Supervisor:
Thyregod, Camilla (Intern)
Main Supervisor:
Clemmensen, Line Katrine Harder (Intern)
Project

UAV Ground Control System
Development of a ground control system for a special purpose unmanned aerial vehicle
Department of Applied Mathematics and Computer Science
Embedded Systems Engineering
Authel Systems IVS
Period: 30/11/2015 → 01/03/2016
Number of participants: 4
Project participant:
Stassen, Flemming (Intern)
Farabi Khanghahi, Fatimeh (Ekstern)
Working partner:
Steffensen, Rasmus (Ekstern)
Haaning, Christian (Ekstern)
Project

Student based learning in multi-facetted learning communities
Department of Applied Mathematics and Computer Science
Statistics and Data Analysis
Period: 01/09/2015 → 31/12/2016
Number of participants: 1
Acronym: STUDeNT-learn
Project participant:
Rootzén, Helle (Intern)
Project

ESS & MAX IV: Cross border science and society
Workpackage: ESS & MAX IV: Cross border network and post graduate educational program
Department of Energy Conversion and Storage
Imaging and Structural Analysis
Department of Physics
Department of Applied Mathematics and Computer Science
University of Copenhagen
MaxLab
Lund University
Chalmers University of Technology
Malmö Högskola
European Spallation Source ESS AB
University of Oslo
University of Gothenburg
Aarhus University
Period: 01/09/2015 → 31/08/2018
Number of participants: 1
X-ray synchrotron scattering, neutron scattering
Project participant:
Kuhn, Luise Theil (Intern)

**Market Mechanisms for Integrated Energy Systems**
Centre for IT-Intelligent Energy Systems in Cities
Department of Electrical Engineering
Center for Electric Power and Energy
Energy Analytics and Markets
Department of Applied Mathematics and Computer Science
Dynamical Systems
Period: 01/07/2015 → 30/06/2018
Number of participants: 3
Phd Student:
Ordoudis, Christos (Intern)
Supervisor:
Morales González, Juan Miguel (Intern)
Main Supervisor:
Pinson, Pierre (Intern)

**EnergyLab Nordhavn - New Urban Energy Infrastructures**
Department of Electrical Engineering
Center for Electric Power and Energy
Energy resources, services and control
Energy Analytics and Markets
Energy system operation and management
Department of Applied Mathematics and Computer Science
Department of Civil Engineering
Section for Building Energy
Section for Indoor Climate and Building Physics
Department of Mechanical Engineering
Thermal Energy
HOFOR A/S
Balslev Consulting Engineers A/S
METRO THERM A/S
ABB Group
Københavns Kommune
By og Havn
Radius Elnet
CleanCharge Solutions
Period: 01/04/2015 → 31/03/2019
Number of participants: 20
Acronym: ELN
Number of related Ph.D. students: 9
Project participant:
Hashemi Toghroljerdi, Seyedmostafa (Intern)
Intelligent Quality Assessment of Railway Switches and Crossings

This project aims at significantly improving the safety, reliability and operational lifetime of the 3500 switches and crossings (S&Cs) in the Danish railway network. The project is a close cooperation between the Technical University of Denmark (DTU), the Danish rail infrastructure provider Rail Net Denmark and four affiliated European partners with significant expertise within this field. An inter-disciplinary scientific effort is employed to obtain enhanced rail transport reliability and regularity simultaneously with significant savings in S&Cs maintenance costs. The project results will make maintenance based on intelligent fault prediction tools, instead of the presently used regular planned inspections, and it will provide sophisticated tools to prevent hidden faults from developing to failure in the future. In a novel approach, the project will install state-of-the-art sensor technology in selected S&Cs and correlate dynamic parameters during train passage with static geometry data from conventional measurement vehicles. Monitoring of the dynamic responses will provide diagnosis of patterns that indicate when components or ballast begin to deviate from fully functional conditions. Modelling of dynamics will identify root causes to signs of degradation. Damage assessment of components identified by anomalous readings will be done by metallurgical examinations. Data and results will be processed by a holistic model that can produce Maintenance Performance Indicators (MPI) for the S&C condition. The correlation of sensor data to measuring vehicle data will allow existing data to be used reliably as input for the MPI model. It is expected that this project will enable optimisation of maintenance procedures, by which appropriate maintenance can be predicted in advance, thus avoiding unscheduled repairs and delays in the railway traffic.
Automation and Control
Department of Mechanical Engineering
Solid Mechanics
Department of Applied Mathematics and Computer Science
Statistics and Data Analysis

Banedanmark
Period: 01/03/2015 → 28/02/2019
Number of participants: 14
Acronym: INTELLISWITCH
Number of related Ph.D. students: 1
Project participant:
Galeazzi, Roberto (Intern)
Blanke, Mogens (Intern)
Hansen, Søren (Intern)
Barkhordari, Pegah (Intern)
Asadzadeh, Seyed Mohammad (Intern)
Santos, Ilmar (Intern)
Tejada, Alejandro de Miguel (Intern)
Danielsen, Hilmar Kjartansson (Intern)
Dhar, Somrita (Intern)
Erbøll, Bjarne Kjær (Intern)
Kulahci, Murat (Intern)
Thyregod, Camilla (Intern)
Hovad, Emil (Intern)
Project Manager, academic:
Juul Jensen, Dorte (Intern)

Financing sources
Source: Public research council
Name of research programme: Innovationsfonden
Web address: http://innovationsfonden.dk/da
Amount: 12,700,000.00 Danish Kroner
Year of approval: 2014

Digital Factory
Collaboration with Odico APS and GXN. Constraint based design and rationalization for robotic hot-wire and hot-blade production of architectural formwork. Supported by Innovation Fund Denmark

Department of Applied Mathematics and Computer Science
Mathematics

Image Analysis & Computer Graphics
Period: 01/03/2015 → 15/12/2018
Number of participants: 4
Project participant:
Gravesen, Jens (Intern)
Bærentzen, Jakob Andreas (Intern)
Project Manager, organisational:
Brander, David (Intern)
Phd Student:
Fisker, Ann-Sofie (Intern)

Intelligent Quality Assessment of Railway Switches and Crossings (INTELLISWITCH)

Department of Electrical Engineering
Computational methods for wind-energy forecasting

Department of Applied Mathematics and Computer Science
Cognitive Systems

Department of Electrical Engineering
Center for Electric Power and Energy

Energy Analytics and Markets
Period: 01/02/2015 → 29/02/2016
Number of participants: 3
Project participant:
Bezzera, Erick (Ekstern)
Supervisor:
Pinson, Pierre (Intern)
Project Coordinator:
Guillot, Gilles (Intern)

COMPUTE Software Group
Many researchers create tools that could be very valuable to a broader audience. Using them, however, is often impeded by the required expertise and/or effort.
This project aims at providing services to all of DTU Compute to help them make their tools and available to the world.

Our goal is to reach out to science and industry to promote the use of the tools and datasets we have created, and thus advance scientific progress at large and its economic dissemination. On a smaller scale, the individual stakeholders each will benefit in turn:

Compute will benefit from increased visibility and newly established contacts and created collaboration opportunities,
The sections will benefit by having more insight into the activities of other sections,
Individual researchers can benefit by more citations and higher visibility.

Department of Applied Mathematics and Computer Science
Software Engineering
Embedded Systems Engineering
Statistics and Data Analysis
**Smart Innovation: Parking Guidance**


**Non-Linear Temporal Machine Learning Models for Conditioning Monitoring in Large-Scale Solar Energy Systems**

PhD project in cooperation with the Technical University of Denmark and GreenGo Energy. GreenGo Energy installs and operates photovoltaic systems for business, housing associations and public entities. The large number of condition monitoring sensors installed in all GreenGo Energy solar energy power plants generates terabyte data that are collected in a common cloud based solution. A global scale synchronized data acquisition system providing data with unprecedented precision, size, geographical diversity provides unique possibilities for big data modeling. A successful machine learning system build on top of the cloud solution will be able to detect many types of faults and wear characteristics. The scale of the data poses computational challenges and requires application and development of novel non-linear dynamical models that scale to large datasets. In the PhD project, Bayesian approaches to filtering will be investigated as well as deep learning methodologies for integration of high frequency heterogeneous sensor data. The service platform will integrate state-of-the-art fault diagnosis, and portfolio based service planning and execution automation.
PhD Project: Segmentation-Driven Tomographic Reconstruction

Computed tomography (CT) is a non-invasive technique for analyzing the interior of objects. The mathematical method of calculating the interior of an object is called reconstruction. A great variety of different reconstruction techniques exist. For this project the goal is to incorporate different forms of prior information into the reconstruction process to achieve results with desired features for a subsequent segmentation. The CT problem is an ill-posed problem, which is a motivation for incorporation prior information, in order to regularize and stabilize the reconstructions. Prior information is based on what we perceive as expected and typical behavior for specific problems, for example an often-used prior for CT reconstructions is piecewise constancy of the solutions, which is utilized by for example Total Variation regularization. Incorporation of prior information in reconstructions is also a part of the overall theme for the ERC project “High-Definition Tomography”, which this project is a part of.

CT is typically used for analyzing biological objects, for medical imaging purposes, though in the research field of material science this has also become a highly used technique. For materials science a typical CT-investigation pipeline consist of four major stages: scanning, reconstruction, segmentation and analysis. Often the reconstruction is carried out by a simple filtered back projection method, whereas the segmentation stage consists of more advanced and computationally expensive methods.

In my project we aim to move the computational effort from the segmentation stage to the reconstruction stage. The reconstruction methods that primarily investigate are related to the variational methods. Prior information about the object we are scanning is used to regularize the reconstruction in order aid the following segmentation stage. Some regularization keywords that I have been working with are: Total Variation, Directional Total Variation, Total Generalized Variation, Mumford-Shah and Eulers Elastica.

Benchmarking and extending models of real estate price prediction, under financial regulation requirements

Benchmarks and extending models of real estate price prediction, under financial regulation requirements
Innovationsnetwork Smart Energy (CLEAN)
Innovation network under CLEAN for smart energy innovation activities.

Department of Civil Engineering
Section for Building Physics and Services
Department of Applied Mathematics and Computer Science
Centre for IT-Intelligent Energy Systems in Cities
Period: 15/08/2014 → 31/12/2017
Number of participants: 2
Acronym: Inno-SE
Project participant:
Heller, Alfred (Intern)
Madsen, Henrik (Intern)

A bi-hormonal Artificial Pancreas based on an Ensemble Nonlinear Model Predictive Control Algorithm
Department of Applied Mathematics and Computer Science
Scientific Computing
Period: 01/08/2014 → 31/07/2017
Number of participants: 1
Project participant:
Boiroux, Dimitri (Intern)

IEA EBC Annex 67 - Energy Flexible Buildings
Energy flexibility in buildings will play an important role in facilitating energy systems based entirely on renewable energy sources. Flexibility is necessary to control the energy consumption to match the actual energy generation from various energy sources such as solar and wind power. However, there is lack of comprehensive knowledge about how much energy flexibility different building types and their usage may be able to offer to the future energy systems.

The aim of this project is to demonstrate how energy flexibility in buildings can provide generating capacity for energy grids, and to identify critical aspects and possible solutions to manage such flexibility. This knowledge is important in order to incorporate energy flexibility of buildings into future smart energy systems and to better accommodate renewable sources in energy systems. It is also important when developing the business case for using building energy flexibility within future systems to potentially reduce costly upgrades of energy distribution grids.

The project objectives are:
– development of common terminology, a definition of ‘energy flexibility in buildings’ and a classification method,
– investigation of user comfort, motivation and acceptance associated with the introduction of energy flexibility in buildings,
– investigation of the energy flexibility potential in different building contexts, and development of design guidelines, control strategies and algorithms
– investigation of the aggregated energy flexibility of buildings and the potential effect on energy grids, and
– demonstration of energy flexibility through experimental and field studies.

Participants: Austria, Belgium, Denmark, France, Italy, the Netherlands, Norway, Portugal, Spain, Switzerland, United Kingdom
Centre for IT-Intelligent Energy Systems in Cities
Department of Civil Engineering
Department of Applied Mathematics and Computer Science
Period: 01/06/2014 → 01/06/2019
Number of participants: 4
Project ID: 26461
Project participant:
Heller, Alfred (Intern)
Madsen, Henrik (Intern)
Gianniou, Panagiota (Intern)
Foteinaki, Kyriaki (Intern)

Project

Waste-2-Energy Smart Grid Upgrade
Department of Applied Mathematics and Computer Science
Dynamical Systems
Krüger A/S

Højteknologifonden
Period: 02/04/2014 → 02/04/2016
Number of participants: 2
WWTP, Smart Grid, MPC
Project participant:
Halvgaard, Rasmus Fogtmann (Intern)
Main Supervisor:
Madsen, Henrik (Intern)

Project

Alliance for Imaging and Modelling of Energy Applications
The CINEMA research alliance will develop unique 3D micro-structural characterization methods, which make it possible to investigate components under realistic conditions and in real time. This will enable correlation between performance and local changes in the microstructure.

Department of Energy Conversion and Storage
Imaging and Structural Analysis
Department of Physics
Neutrons and X-rays for Materials Physics
Department of Wind Energy
Composites and Materials Mechanics
Department of Applied Mathematics and Computer Science
Image Analysis & Computer Graphics
Scientific Computing
Mixed Conductors
Statistics and Data Analysis
University of Copenhagen
Northwestern University
University of Manchester
MaxLab
LM Wind Power
Haldor Topsoe AS
Xnovo Technology ApS
Rockwool International
Amminex Emissions Technology A/S
Period: 01/01/2014 → 31/12/2018
Number of participants: 26
Acronym: CINEMA
Project participant:
Mikkelsen, Lars Pilgaard (Intern)
Sørensen, Bent F. (Intern)
Bowen, Jacob R. (Intern)
Kuhn, Luise Theil (Intern)
Larsen, Rasmus (Intern)
Hansen, Per Christian (Intern)
Frandsen, Henrik Lund (Intern)
Gundlach, Carsten (Intern)
Dahl, Anders Bjorholm (Intern)
Yang, Shu-Yi (Intern)
Poulsen, Stefan Othmar (Intern)
Lyckegaard, Allan (Intern)
Lauridsen, Erik Mejdal (Intern)
Sørensen, Henning Osholm (Ekstern)
Project Manager, organisational:
Sørensen, Hanne (Intern)
Phd Student:
Jespersen, Kristine Munk (Intern)
Beil, Johannes (Ekstern)
Andersen, Michael (Intern)
Emerson, Monica Jane (Intern)
De Angelis, Salvatore (Intern)
Birkelund, Klaus (Ekstern)
Jacobsen, Hjalte Sylvest (Intern)
Chapelle, Lucie (Intern)
Supervisor:
Frandsen, Henrik Lund (Intern)
Project Manager, academic:
Andreasen, Jens Wenzel (Intern)
Project Coordinator:
Poulsen, Henning Friis (Intern)

Relations
Activities:
DTU Energy Conversion 2nd International PhD Summer School
Wilson K. S. Chiu
High resolution ptychographic tomography of soft matter
Gerardina Carbone
DTU Energy Conversion 2nd International PhD Summer School
Publications:
Fatigue damage evolution in fibre composites for wind turbine blades
Micromechanical Time-Lapse X-ray CT Study of Fatigue Damage in Uni-Directional Fibre Composites
Improving organic tandem solar cells based on water-processed nanoparticles by quantitative 3D nanoimaging
Micromechanical Investigation of Fatigue Damage in Uni-Directional Fibre Composites
Dictionary Based Segmentation in Volumes
3D X-Ray Computed Tomography (XCT) of Fatigue Damage Evolution in UD Glass Fibre Composite
Enabling Flexible Polymer Tandem Solar Cells by 3D Ptychographic Imaging
Project
PROActive INtegration of sustainable energy resources enabling active distribution networks

Department of Electrical Engineering
Center for Electric Power and Energy
Energy system operation and management
Department of Applied Mathematics and Computer Science
Software Engineering
Period: 01/01/2014 → 31/12/2017
Number of participants: 4
Acronym: PROAIN
Project participant:
Petersen, Bo Seborg (Intern)
Poulsen, Bjarne (Intern)
Bindner, Henrik W. (Intern)
You, Shi (Intern)

Center for IT-Intelligent Energy Systems for Cities
A wide range of research activities have arisen to support the Danish target of a 100% renewable energy system by 2050. Projects focused on individual aspects of the energy system, such as zero emissions buildings or intelligent power systems provide valuable insight, that facilitates flexibility throughout the energy system. CITIES will address this deficiency by establishing an integrated research centre covering all aspects of the energy system, including gas, power, district heating/cooling and biomass, and most importantly methods to forecast, control and optimize their interactions through the use of advanced ICT solutions.

The high densities of population, energy consumption, and energy and communications networks in cities offer the greatest potential for flexibility at the last cost, and the fact that cities account for 80% of global energy consumption and emissions [1] make the urban environment an ideal setting for energy systems integration research. CITIES will pioneer research into fully integrated city energy systems, building short-term operational models that feed longer term planning models, considering the spatiotemporal variations, interactions, dynamics and stochastics in the energy system. Low level models of system components will inform higher-level aggregate models employed in market and control framework design. The leading position of European academia and industry and the rapidly growing market for smart energy solutions indicates substantial scope for increased competitiveness and job creation within this field. CITIES will, in collaboration with its industrial and academic partners, conduct research with a view to developing tools for the implementation of integrated energy system solutions.

Center granted by Strategic Research Council.

To be a sustainable organisation.

Department of Applied Mathematics and Computer Science
Department of Civil Engineering
Department of Management Engineering
Department of Energy Conversion and Storage
Department of Informatics and Mathematical Modeling
Centre for IT-Intelligent Energy Systems in Cities
Aalborg University
Period: 01/01/2014 → 31/12/2019
Number of participants: 8
Acronym: CITIES
Number of related Ph.D. students: 12
Project participant:
Madsen, Henrik (Intern)
Heller, Alfred (Intern)
Nielsen, Per Sieverts (Intern)
Pedersen, Allan Schröder (Intern)
Rode, Carsten (Intern)
Pinson, Pierre (Intern)
Jørgensen, John Bagterp (Intern)
Project Manager, organisational:
Herrmann, Ivan Tengbjerg (Intern)

Financing sources
Source: Forskningsrådene - Andre
Name of research programme: Energy Programme
Amount: 44.00 Danish Kroner
Year of approval: 2013

Relations
Activities:
Blockchain Summer School 2017
Climate-KIC PhD Summer School Urban Transition Amsterdam-Bologna 2017
CITIES Annual Conference
3rd International Workshop on Design in Civil and Environmental Engineering
Executive Development Programme with Technical University of Denmark
12th International SDEWES Conference
Energy Supply Modelling in Cities: Illustrated Using Data from the Danish Municipality of Sønderborg
Energy Supply Modelling in Cities: Illustrated Using Data from the Case of Sønderborg
Big Data som værktøj til at styre byens energi
The 40th International IAEE Conference
Big Data as a tool for controlling the cities energy: Data aspects and data management
30th International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems
Status and Results of Energy Supply Modelling in CITIES: Illustrated using Data from the Case of Sønderborg

Publications:
Model Identification for Control of Display Units in Supermarket Refrigeration Systems
Project

Starfish - power and management (Sæstjerner) (39087)
The overall objective of the project was to provide the scientific basis for management that can lead to the establishment of a commercial fishery of starfish (Asterias rubens) in primarily the Limfjorden, including Natura 2000 areas. The project background was the increasing prevalence of starfish that is both a threat to the mussel fishing and a potential source of income for fishing. In the project, the population of starfish and production was determined and analyzed and based on population stock estimates and stock modeling a total allowable quota of 10,000 tonnes annually was estimated as a conservative annual catch, which is considered sufficient to maintain a potential starfish meal industry. Effect of fishing was determined both for the population of starfish, the stock of mussels and benthic components like infauna and macroalgae. It was shown that using the starfish purse seine will have no or negligible effects on infauna and blue mussels. In terms of biodiversity and biomass of macro algae, no significant effects of the purse seine, including a load of 300 tonnes of starfish in the net, could be detected. Torn of macro algae leafs were however detected in the purse seine after fishery over macro algae habitats and this was included in management advise on effects of starfish fisheries. A guide for management including recommendations on environmental impact and starfish populations were developed.

This project was coordinated by DTU Aqua.
The project was funded by the Danish Ministry of Food, Agriculture and Fisheries and the European Fisheries Fund (EFF).

National Institute of Aquatic Resources
Danish Shellfish Centre
Department of Applied Mathematics and Computer Science
Foreningen Muslingeerhvervet
Centraforeningen for Limfjorden
Period: 01/01/2014 → 30/06/2015
Number of participants: 6
Research areas: Shellfish and seaweed & Coastal Ecology & Marine Living Resources & Ecosystem based Marine Management
Project participant:
Nielsen, Carsten Fomsgaard (Intern)
Fitridge, Isla (Intern)
Saurel, Camille (Intern)
Thygesen, Uffe Høgsbro (Intern)
Gislason, Henrik (Intern)

Project Coordinator:
Petersen, Jens Kjerulf (Intern)

**Parallelization of vortex methods**
Parallelization of vortex methods using GPU, openMP, MPI, AVX vectorization.

Department of Wind Energy
Aeroelastic Design
Department of Applied Mathematics and Computer Science
Period: 01/12/2013 → 01/04/2015
Number of participants: 2
Project participant:
Branlard, Emmanuel Simon Pierre (Intern)
Sørensen, Hans Henrik Brandenborg (Intern)

**iCull**
Herd-specific economic decision tool for farmers.

National Veterinary Institute
Section for Epidemiology
Section for Veterinary Epidemiology and public sector consultancy
Department of Applied Mathematics and Computer Science

**Dynamical Systems**
Period: 01/11/2013 → 31/10/2015
Number of participants: 6
Acronym: iCull
Project ID: 23176
Project participant:
Kirkeby, Carsten Thure (Intern)
Græsbøll, Kaare (Intern)

Project Manager, organisational:
Toft, Nils (Intern)
Project Manager, academic:
Hisham Beshara Halasa, Tariq (Intern)
Christiansen, Lasse Engbo (Intern)
Saxmose, Søren (Ekstern)

**Relations**
Activities:
SVEPM Annual Meeting 2015
Simulation modelling of paratuberculosis within herds
iCULL – A herd-specific tool for financial evaluation of the impact of paratuberculosis
14th international symposium on veterinary epidemiology and economics

Sizing of Microparticles from Angular Scattering Ratio
This was the pilot project for DTU Compute's 'Number Cruncher Bootcamps' initiative. The results were presented at DTU's first Foodtech Bazaar, held in Roskilde on October 30 2013.
CITS - Copenhagen ITS

Vision: A Green and Smart City
Objective: Demonstrate urban wifi-localization potentials

Problems:
- Traffic congestion and safety
- Traffic information flow to user entities and humans
- Environmental challenges caused by transportation
- Lack of cooperative connection and information systems between: people, vehicles, goods, assets, infrastructure, businesses, and public sector entities
- Lack of integrated smart city traffic and transport management systems, including information flows and user-platforms

Potentials:
- Ubiquitous data collection in Smart City platform architecture based on a background technological infrastructure
- Real-time ITS services and approaches for providing seamless connectivity, interoperability, and secure flow of information across all stakeholders
- General Crowd Management - Methods, Technology (Management and flow description of humans, cars, trucks, goods, assets, etc., through smart-id tagging)
- Digital infrastructure of a localization system consisting of transmitters and sensors in streetlight platforms
- Performance of experimental demonstrations of techniques and systems, consisting of advanced crowd-management systems and next-generation localization technology in Smart City applications
- Large-scale demonstrations connected to the street lamp project of Copenhagen and through visualization of use scenarios

National Space Institute
Geodesy
Office for Innovation & Sector Services
Department of Applied Mathematics and Computer Science
Dynamical Systems
Department of Transport

Transport policy and behaviour
Period: 01/10/2013 → 31/05/2014
Number of participants: 5
Acronym: CITS
Project participant:
Starke, Jens (Intern)
Bacher, Peder (Intern)
Nielsen, Thomas Alexander Sick (Intern)

Project Manager, organisational:
Computational Landscape Genomics
Department of Applied Mathematics and Computer Science

Cognitive Systems
Period: 01/10/2013 → …
Number of participants: 4
Project participant:
Guillot, Gilles (Intern)
Antolin, Mike (Ekstern)
Poss, Mary (Ekstern)

Population structure
Department of Applied Mathematics and Computer Science

Cognitive Systems
Period: 01/07/2013 → …
Number of participants: 2
Project participant:
Guillot, Gilles (Intern)
Orlando, Ludovic (Ekstern)

Integrated Approaches to Food Allergen and Allergy Risk Management
The project will

a. investigate how maternal diet and infant feeding practices (including weaning) modulate the patterns and prevalence of allergies across Europe.
b. Establish risk factors for the development of severe reactions to food and identify associated biomarkers
c. Develop a clinically-validated tiered risk assessment and evidence-based risk management approach for food allergens for allergens in the food chain
d. Develop clinically-relevant multi-analyte methods of analysis suited to allergen management across the food chain

DTU FOOD is actively involved in c. where we work with intake data for food allergy risk assessment and models for risk assessment together with DTU Compute

National Food Institute
Division of Toxicology and Risk Assessment
Division of Nutrition
Department of Applied Mathematics and Computer Science
Statistics and Data Analysis
Period: 01/03/2013 → 28/02/2017
Number of participants: 4
Acronym: iFAAM
Project participant:
Madsen, Charlotte Bernhard (Intern)
Christensen, Tue (Intern)
Brockhoff, Per B. (Intern)
Mills, Clare (Ekstern)
**BLADERUNNER - Large scale cost-effective robotic production of advanced formwork**

Department of Mechanical Engineering

Manufacturing Engineering

Department of Applied Mathematics and Computer Science

Mathematics

Danish Technological Institute

Period: 01/03/2013 → 31/08/2016

Number of participants: 3

Acronym: BLADERUNNER

Project ID: 76421

Project participant:

- Hattel, Jesper Henri (Intern)
- Petkov, Kiril (Intern)
- Gravesen, Jens (Intern)

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**Deep Belief Nets for Topic Modeling**

Applying traditional collaborative filtering to digital publishing is challenging because user data is very sparse due to the high volume of documents relative to the number of users. Content based approaches, on the other hand, is attractive because textual content is often very informative. In this paper we describe large-scale content based collaborative filtering for digital publishing. To solve the digital publishing recommender problem we compare two approaches: latent Dirichlet allocation (LDA) and deep belief nets (DBN) that both find low-dimensional latent representations for documents. Efficient retrieval can be carried out in the latent representation. We work both on public benchmarks and digital media content provided by Issuu, an online publishing platform. This project also comes with a deep belief nets toolbox for topic modeling tailored towards performance evaluation of the DBN model and comparisons to the LDA model.

Department of Applied Mathematics and Computer Science

Cognitive Systems

Period: 01/02/2013 → 01/03/2014

Number of participants: 2

Deep learning, Topic modeling, Machine learning, Neural network

Project participant:

- Maaløe, Lars (Intern)

Main Supervisor:

- Winther, Ole (Intern)

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**Computational statistical methods in evolutionary biology**

Development of new models, algorithms and programs to analyze genetic variation with application in conservation biology, epidemiology and medicine.

Department of Informatics and Mathematical Modeling

Mathematical Statistics

INRA Institut National de La Recherche Agronomique

Centre National de la Recherche Scientifique

Centre de cooperation Internationale en Recherche Agronomique pour le Développement

Period: 01/01/2013 → 31/12/2013

Number of participants: 1

Acronym: EMILE

Project participant:
Technology-supported Risk Estimation by Predictive Assessment of Socio-technical Security

Information security threats to organisations have changed completely over the last decade, due to the complexity and dynamic nature of infrastructures and attacks. Successful attacks cost society billions a year, impacting vital services and the economy. Examples include StuxNet, using infected USB sticks to sabotage nuclear plants, and the DigiNotar attack, using fake digital certificates to spy on website traffic. New attacks cleverly exploit multiple organisational vulnerabilities, involving physical security and human behaviour. Defenders need to make rapid decisions regarding which attacks to block, as both infrastructure and attacker knowledge change rapidly.

Current risk management methods provide descriptive tools for assessing threats by systematic brainstorming. Attack opportunities will be identified and prevented only if people can conceive them. In today’s dynamic attack landscape, this process is too slow and exceeds the limits of human imaginative capability. Emerging security risks demand tool support to predict, prioritise, and prevent complex attacks systematically. The TREsPASS project will make this possible, by building an “attack navigator”. This navigator makes it possible to say which attack opportunities are possible, which of them are the most urgent, and which countermeasures are most effective. To this end, the project combines knowledge from technical sciences (how vulnerable are protocols and software), social sciences (how likely are people to succumb to social engineering), and state-of-the-art industry processes and tools.

By integrating European expertise on socio-technical security into a widely applicable and standardised framework, TREsPASS will reduce security incidents in Europe, and allow organisations and their customers to make informed decisions about security investments. This increased resilience of European businesses both large and small is vital to safeguarding the social and economic prospects of Europe.

Department of Informatics and Mathematical Modeling

Computer Science and Engineering

Language-Based Technology
Period: 01/11/2012 → 31/10/2016
Number of participants: 1
Acronym: TREsPASS
Project participant:
Probst, Christian W. (Intern)

Financing sources
Source: EU research programme (public)
Name of research programme: FP7-ICT-2011-8
Year of approval: 2012

SafeCores InfinIT Mini Project
To investigate the business potential and technical feasibility of Safe Programmable Intellectual Property (IP) Cores

Department of Applied Mathematics and Computer Science

Embedded Systems Engineering
Department of Informatics and Mathematical Modeling

Embedded Systems Engineering
Siemens A/S
Confiware ApS
Danfoss A/S
Period: 01/06/2012 → 31/01/2013
Number of participants: 4
Acronym: SafeCores
Project participant:
Pop, Paul (Intern)
Todirica, Edward Alexandru (Intern)
Petersen, Bjarne (Ekstern)
Project Manager, academic:
Stassen, Flemming (Intern)

Financing sources
**Functional Safety for Industrial Components**
To investigate the technical feasibility of Safe Programmable Intellectual Property (IP) Cores realized on safe FPGAs.

(Projekt mhp ansøgning om støtte under HTF-programmet)

Department of Applied Mathematics and Computer Science
Embedded Systems Engineering
Confiware ApS
Danfoss A/S
Siemens A/S

University of Southern Denmark
Period: 01/02/2012 → 31/01/2013
Number of participants: 4
Acronym: SafeCores
Project participant:
Stassen, Flemming (Intern)
Todirica, Edward Alexandru (Intern)
Pop, Paul (Intern)
Petersen, Bjarne (Intern)

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**EERA DTOC: European Energy Research Alliance Design Tools for Offshore wind farm Clusters**
The project is funded by the EU – Seventh Framework Programme (FP7) – and runs from January 2012 to June 2015. It is coordinated by the Technical University of Denmark - DTU Wind Energy.

The EERA-DTOC project combines expertise to develop a multidisciplinary integrated software tool for an optimized design of offshore wind farms and clusters of wind farms.

Charlotte Bay Hasager is the daily manager of the project. Peter Hauge Madsen is coordinator.

Department of Wind Energy
Meteorology
Department of Applied Mathematics and Computer Science
Wind Energy Systems
Aeroelastic Design
Risø National Laboratory for Sustainable Energy
Fluid Mechanics
Period: 01/01/2012 → 30/06/2015
Number of participants: 15
Offshore wind, wind clusters, design, optimization
Acronym: EERA-DTOC
Project participant:
  Giebel, Gregor (Intern)
  Réthoré, Pierre-Elouan (Intern)
  Cutululis, Nicolaos Antonio (Intern)
  Badger, Merete (Intern)
  Hahmann, Andrea N. (Intern)
  Peña, Alfredo (Intern)
  Badger, Jake (Intern)
  Volker, Patrick (Intern)
  Karagali, Ioanna (Intern)
  Maule, Petr (Intern)
  van der Laan, Paul (Intern)
  Cutululis, Nicolaos Antonio (Intern)
  Hansen, Kurt Schaldemose (Intern)
Project Manager, academic:
  Hasager, Charlotte Bay (Intern)
Project Coordinator:
  Madsen, Peter Hauge (Intern)

Relations
Activities:
Ocean winds from satellites – applications for offshore wind energy
Publications:
  Shadowing effects of offshore wind farms - an idealised mesoscale study
  Energy Yield Prediction of Offshore Wind Farm Clusters at the EERA-DTOC European Project
  EERA DTOC wake results offshore
  EERA Design Tool for Offshore wind farm Cluster (DTOC)
  Offshore winds mapped from satellite remote sensing
  Wind Farm Wake: The Horns Rev Photo Case
  Transmission of wave energy through an offshore wind turbine farm

Heat Storage in Hot Aquifers
Department of Civil Engineering
Section for Geotechnics and Geology
Center for Energy Resources Engineering
Department of Informatics and Mathematical Modeling
Scientific Computing
Period: 01/01/2012 → 28/02/2015
Number of participants: 3
Number of related Ph.D. students: 1
Project participant:
  Rosenbrand, Esther (Intern)
  Mosegaard, Klaus (Intern)
Project Manager, academic:
  Fabricius, Ida Lykke (Intern)

Back Scatter Interferometric Sensor for label-free medical diagnostic assays
Co-supervisor for Ph.D project carried out by Søren Jepsen at Department of Health Science and Technology, Aalborg University
Department of Applied Mathematics and Computer Science
Period: 01/08/2011 → 01/08/2014
Number of participants: 5
Number of related Ph.D. students: 1
Phd Student: Jepsen, Søren Terpager (Ekstern)
Supervisor: Jørgensen, Thomas Martini (Intern)
Trydahl, Torleif (Ekstern)
Sørensen, Henrik Schiøtt (Ekstern)
Main Supervisor: Kristensen, Søren Risom (Ekstern)

Relations
Publications:
Evaluation of back scatter interferometry, a method for detecting protein binding in solution

Project
NordSecMob Master's Programme in Security and Mobile Computing - 2
Department of Applied Mathematics and Computer Science
Embedded Systems Engineering
Aalto University
Norwegian University of Science and Technology
KTH - Royal Institute of Technology
University of Tartu
Period: 01/08/2011 → 31/07/2017
Number of participants: 1
Acronym: NordSecMob
Project participant: Stassen, Flemming (Intern)

Financing sources
Source: Other public support (public)
Name of research programme: Nordplus
Amount: 100,000.00 Euro
Source: EU research programme (public)
Name of research programme: Erasmus Mundus
Amount: 3,200,000.00 Euro
Source: Unknown
Name of research programme: Tuition fees
Amount: 600,000.00 Euro

DemTech: Trustworthy Democratic Technology
Over the last several decades, information technology has transformed the electoral process, which is perhaps the most foundational process upon which democratic societies are built. Computers are gradually replacing the manual parts of the democratic process. For example, rather than hand-counting a vote for days, Microsoft Excel is used to tally results. Or, more locally relevant, a UNIX program is used to compute the seat assignments to parties in parliament, as has been done since 1962 here in Denmark.

Some of these changes make the overall process more efficient or economical. However, there is a risk of the process becoming less trustworthy. The deployed technology tends to be complex, and is therefore prone to programming error and vulnerable to malicious attacks. This, in turn, has an adverse effect on the very foundations of democracy. Voters are less likely to trust the electoral process, which inevitably leads to lower voter participation and cynicism. Consequently, virtually all e-voting researchers, hackers, and activists are against the introduction of computers in the democratic process.

The hypothesis of this research project is the following: Is it possible to modernize the electoral process, while balancing the trust of the people on the trustworthiness of the deployed technology?
In order to provide evidence in support of (or to refute) this hypothesis, we propose to design a rigorous software engineering principle, which we call trust by design, that reproduces the trust-instilling elements of the conventional democratic process in the new electronic infrastructure of elections. Together with our industry partners Aion and Siemens, we will develop electronic election technology based on the trust by design principle. Finally, working with Århus, Copenhagen, and Frederiksberg Municipalities, we will empirically evaluate the technology in order to analyze the social, political, and cultural implications inherent in the digital transformation of the democratic process.

The result of this project will be a computational democratic process and a reference technology platform for electronic elections that e-voting researchers, hackers, and activists the world-over will either (a) acknowledge as being trustworthy, correct, and secure enough for certain kinds of elections, or (b) we will refute the hypothesis and permanently close the door on the use of computers in the democratic process.

Regardless of the outcome, this research will provide decision makers, in Denmark and elsewhere, important and invaluable insights for how to modernize the democratic process without jeopardizing our fundamental democratic principles.

Department of Informatics and Mathematical Modeling

Software Engineering

Department of Mathematics

IT University of Copenhagen

Period: 01/07/2011 → 30/06/2016

Number of participants: 1

E-voting, Democracy, Logic, Ethnography, Activism, Software engineering

Acronym: DemTech

Number of related Ph.D. students: 6

Project participant: Kiniry, Joseph (Intern)

Financing sources

Source: Public research council

Name of research programme: Danish Agency for Science, Technology and Innovation: DSF

Web address: http://www.fi.dk/raad-og-udvalg/det-strategiske-forskningsraad

Amount: 27,750,129.00 Danish Kroner

Year of approval: 2011

Project

Heat Storage in Hot Aquifers

In this project, we will develop new technology to improve planning of energy storage in geothermal reservoirs through high-quality experiments and modelling. Geothermal reservoirs have high temperature, so energy may be stored in these geological layers with minimal heat loss. The technology will be based on a multidisciplinary approach combining small scale geochemistry/rock physics with large scale seismic inversion and history matching of production data. The focus will be on Danish geothermal reservoirs, because heat storage is likely to be the missing link in planning sustainable energy production in Denmark, where several sources of energy should interplay. Energy sources as waste incineration and wind are not controlled by immediate energy demands. By storing energy at low heat loss in hot aquifers, we obtain an effective interplay between different sources of energy. Thereby, the degree of coverage with sustainable energy can increase at an acceptable cost. It is the right time to do this, because geothermal plants are presently being installed in Denmark. Thus, the cost of establishing heat storage in geothermal reservoirs is relatively small. The imminent question with respect to establishing heat storage in geothermal reservoirs is how the reservoirs will react to the introduction of water with a higher temperature than the natural as compared to effects of injecting cold water: How will the reservoir rock react chemically and mechanically, how will the heat and fluid distribute in the reservoir, what is the energy loss related to this storage method, and how will a potential change in water chemistry influence the operation abilities of the geothermal plant? We will evaluate the technology in an international context by collaborating with researchers working with geothermal reservoirs in other European countries.

Center for Energy Resources Engineering

Center

Department of Civil Engineering

Department of Informatics and Mathematical Modeling

De Nationale Geologiske Undersøgelser for Danmark og Grønland

BRGM
Vilnius University
Eidgenössische Technische Hochschule
DONG Energy A/S
Senderborg Fjernvarme A.m.b.a.
Københavns Energi A/S
CTR I/S
VEKS
Period: 01/03/2011 → 28/02/2015
Number of participants: 17
Acronym: HeHo
Project ID: 11/00125
Contact person:
Azaroual, Mohamed (Ekstern)
Sliupa, Saulius (Ekstern)
Khan, Amir (Ekstern)
Magtengaard, Jesper (Ekstern)
Moe, Steffen (Ekstern)
Foged, Magnus (Ekstern)
Elleris, Jan (Ekstern)
Andersen, Flemming (Ekstern)
Project participant:
Rosenbrand, Esther (Intern)
Holmstykke, Hanne Dahl (Ekstern)
Lopez, Simon (Ekstern)
Bickauskas, Giedrius (Ekstern)
Mahler, Allan (Ekstern)
Ragen, Birte (Ekstern)
Project Manager, organisational:
Fabricius, Ida Lykke (Intern)
Mosegaard, Klaus (Intern)
Kjøller, Claus (Ekstern)

Financing sources
Source: Forskningsrådene - Andre
Name of research programme: Forskningsrådene - Andre
Amount: 5,658,000.00 Danish Kroner
Project

Heat Storage in Hot Aquifers
Department of Civil Engineering
Section for Geotechnics and Geology
Center for Energy Resources Engineering
Department of Informatics and Mathematical Modeling
Scientific Computing
Department of Environmental Engineering
Period: 01/03/2011 → 28/02/2012
Number of participants: 4
Project participant:
Mosegaard, Klaus (Intern)
Kjøller, Claus (Intern)
Phd Student:
Rosenbrand, Esther (Intern)
Control & Surveillance of Automated Production Steps (a part of the inSPIRe Food)

Summary of project: Automation of many manual operations in the food industry is difficult, because the criteria for process control are often based on tacit knowledge of the operator. Our hypothesis is that a route to optimal automation of such operations is to register how the trained process operator makes decisions from observations of the process and combining this knowledge with predictive modelling of input/output of the process units.

Department of Applied Mathematics and Computer Science
Statistics and Data Analysis
National Food Institute
Research Group for Food Production Engineering

Image Analysis & Computer Graphics
Period: 01/01/2011 → 31/12/2016
Number of participants: 5
Project participant:
Larsen, Rasmus (Intern)
Ersbøll, Bjarne Kjær (Intern)
Frosch, Stina (Intern)
Clemmensen, Line Katrine Harder (Intern)
Larsen, Anders Boesen Lindbo (Intern)

Financing sources
Source: Public research council
Name of research programme: Danish Council for Strategic Research and the Danish Council for Technology (now The Danish Innovation Foundation)
Amount: 5,218,000.00 Danish Kroner

Symmetry Techniques in Differential Geometry
Joint project with Andrew Swann (Aarhus University) and Martin Svensson (USD).
The aim is to apply loop group techniques and moment map techniques to problems arising in differential geometry and mathematical physics.

FNU Grant
Department of Applied Mathematics and Computer Science
Mathematics
Period: 01/01/2011 → 31/12/2013
Number of participants: 3
Acronym: Symmetry Techniques
Project participant:
Brander, David (Intern)
Svensson, Martin (Ekstern)
Swann, Andrew (Ekstern)

Financing sources
Source: Public research council
Name of research programme: Danish Council for Independent Research - Natural Sciences
Amount: 669,600.00 Danish Kroner
Year of approval: 2010
Project

Multivariate Analysis Techniques for Optimal Vision Design
Department of Informatics and Mathematical Modeling
Period: 01/10/2010 → 10/01/2011
Number of participants: 3
Phd Student:
Mazzaretto, Andrea (Intern)
Supervisor:
Clemmensen, Line Katrine Harder (Intern)
Main Supervisor:
Ersbøll, Bjarne Kjær (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering
Project: PhD

Computational statistical methods in population genetics
Department of Informatics and Mathematical Modeling
Period: 01/09/2010 → 31/08/2012
Number of participants: 0

Financing sources
Source: Udenfor rammen
Name of research programme: Ukendt
Project

Facial recognition
Department of Informatics and Mathematical Modeling
Period: 01/09/2010 → 26/02/2014
Number of participants: 5
Phd Student:
Fagertun, Jens (Intern)
Main Supervisor:
Paulsen, Rasmus Reinhold (Intern)
Examiner:
Clemmensen, Line Katrine Harder (Intern)
Cootes, Timothy F. (Ekstern)
Hansen, Dan Witzner (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU)
Project: PhD

Round-trip Engineering of Service-Oriented Architectures
Department of Informatics and Mathematical Modeling
Period: 01/09/2010 → 22/11/2013
Number of participants: 6
Phd Student:
Carvalho Quaresma, Jose Nuno (Intern)
Supervisor:
Nielsen, Flemming (Intern)
Main Supervisor:
Probst, Christian W. (Intern)
Examiner:
Dragoni, Nicola (Intern)
Gollmann, Dieter (Ekstern)
Kammüller, Florian (Ekstern)
Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU)
Project: PhD

Hvirveldynamik og strømningstopologi
Department of Informatics and Mathematical Modeling
Period: 01/08/2010 → 22/11/2013
Number of participants: 5
Phd Student:
Andersen, Morten (Intern)
Main Supervisor:
Brøns, Morten (Intern)
Examiner:
Bohr, Tomas (Intern)
Kanso, Eva (Ekstern)
Stremler, Mark A. (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU)
Project: PhD

Static Analysis for Model Checking
Department of Informatics and Mathematical Modeling
Period: 01/08/2010 → 25/10/2013
Number of participants: 6
Phd Student:
Terepeta, Michal Tomasz (Intern)
Supervisor:
Nielsen, Flemming (Intern)
Main Supervisor:
Nielsen, Hanne Riis (Intern)
Examiner:
Mödersheim, Sebastian Alexander (Intern)
Cortesi, Agostino (Ekstern)
Jensen, Thomas (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: 1/3 FUU, 1/3 inst 1/3 Andet
Project: PhD

Construction and decoding of algebraic codes
Department of Informatics and Mathematical Modeling
Period: 01/07/2010 → 30/09/2013
Number of participants: 6
Phd Student:
Rosenkilde, Johan Sebastian Heesemann (Intern)
Supervisor:
Høholdt, Tom (Intern)
Main Supervisor:
Beelen, Peter (Intern)
Examiner:
Geil, Hans Olav (Ekstern)
Augot, Daniel (Ekstern)
Bossert, Martin (Ekstern)
Nysted 2, Wakes
The objective of this project is on basis of simple turbine measurements in a wind farm to identify, model and verify the basic mechanisms driving the increased loading experienced by turbines operating in offshore Wind farm.

Department of Wind Energy
Aeroelastic Design
Department of Applied Mathematics and Computer Science
Test and Measurements

Grontmij A/S
Period: 01/06/2010 → 30/06/2014
Number of participants: 4
Acronym: 43026 4610-PSO
Project participant:
  Pedersen, Mads Mølgaard (Intern)
  Aagaard Madsen, Helge (Intern)
  Larsen, Torben J. (Intern)
Project Manager, academic:
  Larsen, Gunner Chr. (Intern)
Project

Centre for imaging food quality
Department of Informatics and Mathematical Modeling
Department of Photonics Engineering
Danisco AS
Arla Foods
Danish Technological Institute
NKT Photonics A/S
Videometer A/S
Period: 01/06/2010 → 31/12/2014
Number of participants: 4
Acronym: CIFQ
Project participant:
  Jørgensen, Thomas Martini (Intern)
  Kamran, Faisal (Intern)
Project Manager, organisational:
  Andersen, Peter E. (Intern)
  Larsen, Rasmus (Intern)

Financing sources
Source: Forskningsrådene - Andre
Name of research programme: Forskningsrådene - Andre
Amount: 20,000,000.00 Danish Kroner
Project

Models for the energy performance of low-energy houses
Department of Informatics and Mathematical Modeling
Period: 01/05/2010 → 24/01/2014
Number of participants: 6
Phd Student:
Numerical Methods for Reservoir Simulation and Optimization

Department of Informatics and Mathematical Modeling
Period: 01/05/2010 → 25/04/2014
Number of participants: 5
Phd Student: Capolei, Andrea (Intern)
Main Supervisor: Jørgensen, John Bagterp (Intern)
Examiner: Poulsen, Niels Kjølstad (Intern)
Jansen, Jan Dirk (Ekstern)
Knudsen, Jørgen K. H. (Ekstern)

Scientific GPU Computing for PDE Solvers

Department of Informatics and Mathematical Modeling
Period: 01/05/2010 → 12/12/2013
Number of participants: 6
Phd Student: Glimberg, Stefan Lemvig (Intern)
Supervisor: Dammann, Bernd (Intern)
Main Supervisor: Engsig-Karup, Allan Peter (Intern)
Examiner: Walther, Jens Honore (Intern)
Cai, Xing (Ekstern)
Olson, Luke (Ekstern)

Anatomical surface reconstruction and optimization

Department of Informatics and Mathematical Modeling
Period: 15/04/2010 → 30/08/2013
Number of participants: 6
Phd Student:
Determination of magnetic resonance imaging biomarkers for multiple sclerosis treatment effects

Department of Informatics and Mathematical Modeling
Period: 01/04/2010 → 17/06/2013
Number of participants: 7
PhD Student:
Lyksborg, Mark (Intern)
Supervisor:
Dyrby, Tim Bjørn (Intern)
Siebner, Hartwig R. (Ekstern)
Main Supervisor:
Larsen, Rasmus (Intern)
Examiner:
Paulsen, Rasmus Reinhold (Intern)
Jones, Derek K. (Ekstern)
Westin, Carl-Fredrik (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut, samfinansiering
Project: PhD

Large Scale Machine Learning in High-dimensional Data

Department of Informatics and Mathematical Modeling
Period: 01/04/2010 → 30/08/2013
Number of participants: 5
PhD Student:
Hansen, Toke Jansen (Intern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Winther, Ole (Intern)
Kjær, Troels Wesenberg (Ekstern)
Müller, Klaus-Robert (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU)
Project: PhD

Matematisk modelling af membranseparation

Department of Informatics and Mathematical Modeling
Period: 01/04/2010 → 20/03/2014
Number of participants: 7
Phd Student:
Vinther, Frank (Intern)
Supervisor:
Meyer, Anne S. (Intern)
Sørensen, Mads Peter (Intern)
Main Supervisor:
Brøns, Morten (Intern)
Examiner:
Hassager, Ole (Intern)
Davis, Robert H. (Ekstern)
Jönsson, Ann-Sofi (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU) Samf.
Project: PhD

Power Management for Refrigeration Systems
Department of Informatics and Mathematical Modeling
Period: 01/04/2010 → 24/05/2013
Number of participants: 8
Phd Student:
Hovgaard, Tobias Gybel (Intern)
Supervisor:
Blanke, Mogens (Intern)
Larsen, Lars F. S. (Ekstern)
Skovrup, Morten Juel (Intern)
Main Supervisor:
Jørgensen, John Bagterp (Intern)
Examiner:
Poulsen, Niels Kjølstad (Intern)
Morari, Manfred (Ekstern)
Mølbak, Tommy (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: ErhvervsPhD-ordningen VTU
Project: PhD

Integrated Modeling of Oil Reservoirs - seismic and geostatistical analysis
Department of Informatics and Mathematical Modeling
Period: 01/03/2010 → 30/08/2013
Number of participants: 6
Phd Student:
Lange, Katrine (Intern)
Supervisor:
Hansen, Per Christian (Intern)
Stenby, Erling Halfdan (Intern)
Main Supervisor:
Mosegaard, Klaus (Intern)
Examiner:
Knudsen, Per (Intern)
Kolbjørnsen, Odd (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering
Project: PhD

**Specifying and verifying medical robotics software to ensure harmless operation**

Department of Informatics and Mathematical Modeling  
Period: 01/03/2010 → 24/06/2014  
Number of participants: 6  
Phd Student: Herbert, Luke Thomas (Intern)  
Supervisor: Hansen, Michael Reichhardt (Intern)  
Main Supervisor: Sharp, Robin (Intern)  
Examiner: Kindler, Ekkart (Intern)  
Fränzle, Martin (Intern)  
Weske, Mathias (Ekstern)  

Financing sources  
Source: Internal funding (public)  
Name of research programme: Institut stipendie (DTU) Samf.  
Project: PhD

**Automated Image-Based Procedures for Radio-Therapy Treatment Evaluation and Daily Dose Re-Planning**

Department of Informatics and Mathematical Modeling  
Period: 01/01/2010 → 22/11/2013  
Number of participants: 8  
Phd Student: Bjerre, Troels (Intern)  
Supervisor: Aznar, Marianne (Ekstern)  
Rosenschöld, Per Munck af (Ekstern)  
Specht, Lena (Ekstern)  
Main Supervisor: Larsen, Rasmus (Intern)  
Examiner: Van Leemput, Koen (Intern)  
Ourselin, Sebastien (Ekstern)  
Sarrut, David (Ekstern)  

Financing sources  
Source: Internal funding (public)  
Name of research programme: Institut, samfinansiering  
Project: PhD

**Central digraphs**

Department of Mathematics  
California State University  
Period: 01/01/2010 → 01/01/2011  
Number of participants: 2  
Project participant: Leander, Gregor (Intern)  
Thomassen, Carsten (Intern)  
Project
Cryptanalysis of Some Lightweight Symmetric Ciphers

Department of Informatics and Mathematical Modeling
Period: 01/01/2010 → 22/03/2013
Number of participants: 7
Phd Student:
Abdelraheem, Mohamed Ahmed A. M. A. (Intern)
Supervisor:
Leander, Gregor (Intern)
Zenner, Erik (Intern)
Main Supervisor:
Knudsen, Lars Ramkilde (Intern)
Examiner:
Rechberger, Christian (Intern)
Canteaut, Anne Michele (Intern)
Johansson, Thomas (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU)
Project: PhD

Emulated power and radiance minimization for safer cellular phones with longer lasting batteries

Department of Informatics and Mathematical Modeling
Period: 01/01/2010 → 25/10/2013
Number of participants: 6
Phd Student:
Musiige, Deogratius (Intern)
Supervisor:
Mioc, Darka (Intern)
Main Supervisor:
Antón Castro, Francesc/François (Intern)
Examiner:
Merayo, José M.G. (Intern)
De La Cruz Blas, Carlos A. (Ekstern)
Prasad, Ramjee (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: ErhvervsPhD-ordningen VTU
Project: PhD

Impact of Stochastic Generation on Electricity Market Dynamics

Department of Informatics and Mathematical Modeling
Period: 01/01/2010 → 30/08/2013
Number of participants: 7
Phd Student:
Zugno, Marco (Intern)
Supervisor:
Morales González, Juan Miguel (Intern)
Madsen, Henrik (Intern)
Main Supervisor:
Pinson, Pierre (Intern)
Examiner:
Rasmussen, Kouros M. (Intern)
Boomsma, Kristoffersen (Intern)
Hobbs, Benjamin F. (Ekstern)

Financing sources
Modelling spread of Bluetongue and other vector borne diseases in Denmark and evaluation of intervention strategies

Department of Informatics and Mathematical Modeling
Period: 01/01/2010 → 22/03/2013
Number of participants: 6
PhD Student:
Græsbøll, Kaare (Intern)
Supervisor:
Enæ, Claes (Intern)
Main Supervisor:
Christiansen, Lasse Engbo (Intern)
Examiner:
Thygesen, Uffe Høgsbro (Intern)
Konradsen, Flemming (Ekstern)
de Koeijer, Aline A. (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: 1/3 DTU-stip, 2/3 FUR/andet
Project: PhD

Quantitative assessment of course evaluation

Department of Informatics and Mathematical Modeling
Period: 01/01/2010 → 20/03/2014
Number of participants: 5
PhD Student:
Sliusarenko, Tamara (Intern)
Main Supervisor:
Ersbøll, Bjarne Kjær (Intern)
Examiner:
Conradsen, Knut (Intern)
Adawi, Tom W (Ekstern)
Malmi, Lauri T. E. (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: 1/3 FUU, 1/3 inst 1/3 Andet
Project: PhD

Dimension reduction methods applied to mechanical systems

Department of Informatics and Mathematical Modeling
Period: 15/12/2009 → 20/03/2014
Number of participants: 7
PhD Student:
Elmegård, Michael (Intern)
Supervisor:
Evgrafov, Anton (Intern)
Thomsen, Jon Juel (Intern)
Main Supervisor:
Starke, Jens (Intern)
Examiner:
Hjorth, Poul G. (Intern)
Kerschen, Gaëtan (Ekstern)
Sieber, Jan (Ekstern)
Logics and models for stochastic analysis of information systems

Department of Informatics and Mathematical Modeling
Period: 01/11/2009 → 07/03/2013
Number of participants: 6
Phd Student:
Zeng, Kebin (Intern)
Supervisor:
Nielsen, Flemming (Intern)
Main Supervisor:
Nielsen, Bo Friis (Intern)
Examiner:
Zhang, Lijun (Intern)
Buchholz, Peter (Ekstern)
Hillston, Jane (Ekstern)

Statistisk modellering af marine økosystemer

Department of Informatics and Mathematical Modeling
Period: 01/11/2009 → 30/08/2013
Number of participants: 7
Phd Student:
Berg, Casper Willestofte (Intern)
Supervisor:
Nielsen, Anders (Intern)
Thygesen, Uffe Høgsbro (Intern)
Main Supervisor:
Madsen, Henrik (Intern)
Examiner:
Andersen, Ken Haste (Intern)
Cadigan, Noel G. (Ekstern)
Nielsen, Søren F. (Ekstern)

Adaptable communication middleware for network on a chip based multi core architectures

Department of Informatics and Mathematical Modeling
Period: 01/10/2009 → 09/04/2013
Number of participants: 3
Phd Student:
Passas, Stavros (Intern)
Supervisor:
Madsen, Jan (Intern)
Main Supervisor:
Karlsson, Sven (Intern)
Attacker Models for Ubiquitous Computing
Department of Informatics and Mathematical Modeling
Period: 01/10/2009 → 24/05/2013
Number of participants: 5
Phd Student: Papini, Davide (Intern)
Supervisor: Jensen, Christian D. (Intern)
Main Supervisor: Sharp, Robin (Intern)
Examiner: Mödersheim, Sebastian Alexander (Intern)
Skou, Arne Joachim (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU)
Project: PhD

Tomography with Prior Information
Department of Informatics and Mathematical Modeling
Period: 01/10/2009 → 17/06/2013
Number of participants: 7
Phd Student: Jørgensen, Jakob Sauer (Intern)
Supervisor: Schmidt, Søren (Intern)
Sidky, Emil (Ekstern)
Main Supervisor: Hansen, Per Christian (Intern)
Examiner: Larsen, Rasmus Werner (Intern)
Arridge, Simon R. (Ekstern)
Siltanen, Samuli (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU) Samf.
Project: PhD

System-Level Design of Continuous Flow Microfluidic Biochips
Department of Informatics and Mathematical Modeling
Period: 15/09/2009 → 07/03/2013
Number of participants: 6
Phd Student: Minhass, Wajid Hassan (Intern)
Supervisor: Madsen, Jan (Intern)
Main Supervisor: Pop, Paul (Intern)
Examiner: Nannarelli, Alberto (Intern)
Catthoor, Francky (Ekstern)
Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering
Project: PhD

Nordic Master School in Innovative Information and Communication Technologies
Department of Applied Mathematics and Computer Science
Embedded Systems Engineering
Period: 01/09/2009 → 31/08/2013
Number of participants: 1
Acronym: NMS iiICT
Project participant:
Stassen, Flemming (Intern)

Financing sources
Source: Other public support (public)
Name of research programme: Nordplus framework programme
Web address: http://www.nordplusonline.org/
Amount: 298,124.00 Danish Kroner
Year of approval: 2009

Relations
Activities:
Nordic Master School in Innovative ICT (NMS iiICT) (External organisation)

Nordplus Framework Programme for Higher Education
Nordic Master School in Innovative Information and Communication Technologies
Department of Applied Mathematics and Computer Science
Embedded Systems Engineering
Period: 01/09/2009 → 22/11/2012
Number of participants: 3
Acronym: NMS iiICT
Project participant:
Stassen, Flemming (Intern)
Pop, Paul (Intern)
Madsen, Jan (Intern)

Relations
Activities:
Nordic Master School in Innovative ICT (NMS iiICT) (External organisation)

Combined Techniques of Static Analysis and Model Checking
Department of Informatics and Mathematical Modeling
Period: 01/09/2009 → 22/11/2012
Number of participants: 6
Phd Student:
Zhang, Fuyuan (Intern)
Supervisor:
Nielsen, Hanne Riis (Intern)
Main Supervisor:
Nielsen, Flemming (Intern)
Examiner:
Probst, Christian W. (Intern)
Dam, Mads (Ekstern)
Huth, Michael (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: 1/3 FUU, 1/3 inst 1/3 Andet
Project: PhD

Development and Application of Image Analysis and Multivariate Statistics in Industrial Aquaculture Feed Production

Department of Informatics and Mathematical Modeling
Period: 01/09/2009 → 22/11/2012
Number of participants: 6
Phd Student:
Ljungqvist, Martin Georg (Intern)
Supervisor:
Frosch, Stina (Intern)
Main Supervisor:
Ersbøll, Bjarne Kjær (Intern)
Examiner:
Conradsen, Knut (Intern)
Christensen, Lars Bager (Intern)
Misimi, Ekrem (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut, samfinansiering
Project: PhD

Knowledge Discovery in the Blogosphere

Department of Informatics and Mathematical Modeling
Period: 01/09/2009 → 31/10/2011
Number of participants: 2
Phd Student:
Szewczyk, Marcin Marek (Intern)
Main Supervisor:
Hansen, Lars Kai (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering
Project: PhD

Mathematical Road Models for the Traffic Speed Deflectometer

Department of Informatics and Mathematical Modeling
Period: 01/09/2009 → 22/03/2013
Number of participants: 6
Phd Student:
Pedersen, Louis (Intern)
Supervisor:
Knudsen, Kim (Intern)
Main Supervisor:
Hjorth, Poul G. (Intern)
Examiner:
Markvorsen, Steen (Intern)
Baltzer, Susanne (Ekstern)
Piau, Jean-Michel (Ekstern)

Financing sources
Model Predictive Control algorithms for pen and pump insulin administration

Department of Informatics and Mathematical Modeling
Period: 01/09/2009 → 22/11/2012
Number of participants: 7
Phd Student:
Boiroux, Dimitri (Intern)
Supervisor:
Madsen, Henrik (Intern)
Poulsen, Niels Kjølstad (Intern)
Main Supervisor:
Jørgensen, John Bagterp (Intern)
Examiner:
Sørensen, Mads Peter (Intern)
Knudsen, Jørgen K. H. (Ekstern)
del Re, Luigi (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering
Project: PhD

Statistical inference methods for evolutionary biology

Mathematical Statistics
Department of Informatics and Mathematical Modeling
Period: 01/09/2009 → 31/08/2012
Number of participants: 1
Acronym: EMILE
Project ID: 15778
Project Manager, organisational:
Guillot, Gilles (Intern)

Financing sources
Source: Uddannelse, udenlandske offentlige og private
Name of research programme: Uddannelse, udenlandske offentlige og private
Amount: 350,000.00 Danish Kroner
Project

Concurrent Aero-Servo-Elastic analysis and Design of wind turbines

Department of Informatics and Mathematical Modeling
Period: 15/08/2009 → 07/03/2013
Number of participants: 6
Phd Student:
Mirzaei, Mahmood (Intern)
Supervisor:
Niemann, Hans Henrik (Intern)
Main Supervisor:
Poulsen, Niels Kjølstad (Intern)
Examiner:
Jørgensen, John Bagterp (Intern)
Bottasso, Carlo L. (Ekstern)
Stoustrup, Jakob (Intern)

Financing sources
Source: Internal funding (public)
Methodology for combining sensory properties with additional information in consumer acceptance studies of food products

The project focuses on method development for better understanding of consumer acceptance of food products with added values related to health benefits, environment and user-friendliness. The main goal is to develop and make available statistical methods that can be used to identify the important factors for consumer acceptance, their interactions and their optimal combinations. This will be achieved through the following contents: 1) Statistical method development with focus on the combined use of experimental design and multivariate analysis 2) Development of an easy-to-use open source software package 3) Industry based method development, 4) writing scientific papers, giving courses and producing a PhD degree in Sensometrics. The industrial effect will be 1) lowering the costs of product development, 2) reduced product development time 3) higher hit rate of new products and 4) better predictions of product potential. Since most relevant Danish and Norwegian stakeholders are participating together with an interested international network in Netherlands, Australia and South Africa, the project will add to the already ongoing process of turning Denmark and Norway into one of the major international players for handling sensory and consumer data.

Department of Applied Mathematics and Computer Science
Statistics and Data Analysis
National Food Institute
Research Group for Bioactives – Analysis and Application
Period: 01/08/2009 → 30/04/2015
Number of participants: 3
Acronym: ConsumerCheck
Project participant:
Bruun Brockhoff, Per (Ekstern)
Kuznetsova, Alexandra (Intern)
Hyldig, Grethe (Intern)

Financing sources
Source: Private funding (private)
Name of research programme: FødevareErhverv
Amount: 7,663,135.00 Danish Kroner
Project

Analysis of SHA-3 hash function/Formal analysis of cryptographic hash functions

Cryptographic hash functions are one of the most important tools used in the design of efficient cryptographic protocols such as digital signatures that enable secure communications over the Internet. Cryptographic protocols are often proved secure assuming that the underlying hash functions are secure. Ever since the hash function SHA-1 has been adopted as the Federal Information Processing Standard (FIPS) by the NIST, U.S, it has been deployed in many provably secure cryptographic protocols. Security vulnerabilities that are exposed in SHA-1 and other standard hash functions have dramatically reduced our confidence in using current hash functions as secure mechanisms in the cryptographic protocols. In search of a secure hash function, NIST, U.S, initiated a global competition in 2007 to select a new hash function by 2012 which will be referred to as SHA-3. Many popular hash function constructions and those submitted to the SHA-3 competition are based on block ciphers. The goal of this research project is to carry out formal as well as concrete analysis of hash functions based on block ciphers thereby contributing to the understanding of the theory of hash functions and selection of SHA-3. This analysis will strengthen our confidence in proving the security of cryptographic protocols and later implement them using hash functions whose security is known. This project has been sponsored by the Danish Research Council for Independent Research (Technology and Production Sciences and Natural Sciences) under the grant numbered 274-09-0096.

Department of Mathematics
Period: 01/08/2009 → 31/07/2011
Number of participants: 2
Hash functions, cryptanalysis, design, SHA-3 and NIST
Project ID: 274-09-0096
Contact person:
Knudsen, Lars Ramkilde (Intern)
Project Manager, organisational:
Gauravaram, Praveen (Intern)
Financing sources
Source: Forskningsrådene - Andre
Name of research programme: Forskningsrådene - Andre
Amount: 159,060,000.00 Danish Kroner

Kernel Methods for Machine Learning with life-sciences applications
Department of Informatics and Mathematical Modeling
Period: 01/08/2009 → 30/08/2013
Number of participants: 6
Phd Student:
Abrahamsen, Trine Julie (Intern)
Supervisor:
Winther, Ole (Intern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Larsen, Jan (Ekstern)
Jensen, Søren Holdt (Intern)
Kaski, Samuel (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU)

Planning and evaluation of radio-therapeutic treatment of head-and-neck cancer using PET/CT scanning
Department of Informatics and Mathematical Modeling
Period: 01/08/2009 → 19/12/2012
Number of participants: 7
Phd Student:
Hollensen, Christian (Intern)
Supervisor:
Hejgaard, Liselotte (Intern)
Specht, Lena (Ekstern)
Main Supervisor:
Larsen, Rasmus (Intern)
Examiner:
Paulsen, Rasmus Reinhold (Intern)
Ballester, Miguel A. G. (Ekstern)
Visvikis, Dimitris (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: 1/3 DTU-stip, 2/3 FUR/andet

Static Analysis and Model Checking of Software Systems
Department of Informatics and Mathematical Modeling
Period: 01/08/2009 → 25/10/2012
Number of participants: 6
Phd Student:
Filipiuk, Piotr (Intern)
Supervisor:
Nielson, Flemming (Intern)
Main Supervisor:
Nielson, Hanne Riis (Intern)
Examiner:
Probst, Christian W. (Intern)
Schmidt, David A. (Ekstern)
Seidl, Helmut (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU)
Project: PhD

Systems neuroimaging: Modeling non-linear information processing networks
Department of Informatics and Mathematical Modeling
Period: 01/08/2009 → 01/11/2015
Number of participants: 2
Phd Student:
Klinkby, Kristian Tjalfe (Intern)
Main Supervisor:
Hansen, Lars Kai (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU)
Project: PhD

Indikatorer på det fejlfrie byggeri
Department of Management Engineering
Planning and Management of the Built Environment
Department of Informatics and Mathematical Modeling
Period: 01/07/2009 → 31/12/2012
Number of participants: 3
Project participant:
Jørgensen, Kirsten (Intern)
Schultz, Casper Siebken (Intern)
Bonke, Sten (Intern)

Device Centric Authentication for Ubiquitous Computing
Department of Informatics and Mathematical Modeling
Period: 15/06/2009 → 28/09/2012
Number of participants: 6
Phd Student:
Ahmed, Naveed (Intern)
Supervisor:
Zenner, Erik (Intern)
Main Supervisor:
Jensen, Christian D. (Intern)
Examiner:
Knudsen, Lars Ramkilde (Intern)
Crampton, Jason (Ekstern)
Knapskog, Svein Johan (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU)
Project: PhD
Cognizant Hearing Aids
Department of Informatics and Mathematical Modeling
Period: 02/06/2009 → 21/09/2012
Number of participants: 5
Phd Student:
Karadogan, Seliz Gülzen (Intern)
Main Supervisor:
Larsen, Jan (Intern)
Examiner:
Winther, Ole (Intern)
Jensen, Søren Holdt (Intern)
Schuller, Björn Wolfgang (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU)
Project: PhD

Formal approaches for Aspect-Oriented Systems
Department of Informatics and Mathematical Modeling
Period: 01/06/2009 → 28/09/2012
Number of participants: 6
Phd Student:
Hernandez, Alejandro Mario (Intern)
Supervisor:
Nielsen, Hanne Riis (Intern)
Main Supervisor:
Nielsen, Flemming (Intern)
Examiner:
Probst, Christian W. (Intern)
De Nicola, Rocco (Ekstern)
Hankin, Chris (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering
Project: PhD

Formal methods for design and simulation of embedded systems
Department of Informatics and Mathematical Modeling
Period: 01/06/2009 → 30/08/2013
Number of participants: 6
Phd Student:
Jakobsen, Mikkel Koefoed (Intern)
Supervisor:
Hansen, Michael Reichhardt (Intern)
Main Supervisor:
Madsen, Jan (Intern)
Examiner:
Dragoni, Nicola (Intern)
Plosila, Juha Petteri (Ekstern)
Vain, Jüri (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: 1/3 FUU, 1/3 inst 1/3 Andet
Project: PhD
Stokastisk dynamisk moddeling til kort-tidsregulering af glukose/insulin-metabolismen

Department of Informatics and Mathematical Modeling  
Period: 01/06/2009 → 12/12/2013  
Number of participants: 6  
Phd Student:  
Duun-Henriksen, Anne Katrine (Intern)  
Supervisor:  
Jensen, Peter Ruhdal (Intern)  
Main Supervisor:  
Madsen, Henrik (Intern)  
Examiner:  
Christiansen, Lasse Engbo (Intern)  
Andreassen, Steen (Ekstern)  
Gabrielsson, Johan (Ekstern)

Financing sources
Source: Internal funding (public)  
Name of research programme: Forskningsrådsfinansiering  
Project: PhD

Surface Reconstruction of Coherent Deformable 3D Scans with Topological Recovery

Department of Informatics and Mathematical Modeling  
Period: 01/05/2009 → 31/10/2010  
Number of participants: 4  
Phd Student:  
Giotis, Nikolaos (Intern)  
Supervisor:  
Bærentzen, Jakob Andreas (Intern)  
Paulsen, Rasmus Reinhold (Intern)  
Main Supervisor:  
Antón Castro, Francesc/François (Intern)

Financing sources
Source: Internal funding (public)  
Name of research programme: Institut stipendie (DTU)  
Project: PhD

Towards the Interactive ESS-Food Catalogue

Department of Informatics and Mathematical Modeling  
Period: 01/05/2009 → 24/08/2012  
Number of participants: 7  
Phd Student:  
Laursen, Lasse Farnung (Intern)  
Supervisor:  
Bærentzen, Jakob Andreas (Intern)  
Christensen, Lars Bager (Intern)  
Main Supervisor:  
Ersbøll, Bjarne Kjær (Intern)  
Examiner:  
Carstensen, Jens Michael (Intern)  
Madsen, Claus Brøndsgaard (Ekstern)  
Sramek, Milos (Ekstern)

Financing sources
Source: Internal funding (public)  
Name of research programme: 1/3 DTU-stip, 2/3 FUR/andet  
Project: PhD
Active learning in cognitive information processing systems

Department of Informatics and Mathematical Modeling
Period: 01/04/2009 → 19/04/2013
Number of participants: 6
Phd Student:
Jensen, Bjørn Sand (Intern)
Supervisor:
Hansen, Lars Kai (Intern)
Main Supervisor:
Larsen, Jan (Intern)
Examiner:
Winther, Ole (Intern)
Cemgil, Ali Taylan (Ekstern)
Plumbley, Mark David (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU)
Project: PhD

Electrophysiological correlates of spatiotemporal attention in humans

Department of Informatics and Mathematical Modeling
Period: 01/04/2009 → 21/09/2012
Number of participants: 6
Phd Student:
Nielsen, Simon (Intern)
Supervisor:
Hansen, Lars Kai (Intern)
Main Supervisor:
Andersen, Tobias (Intern)
Examiner:
Mørup, Morten (Intern)
Kyllingsbæk, Søren (Intern)
Nieuwenstein, Mark R. (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU)
Project: PhD

Equation-Free Analysis of Mechanical Vibrations

Mechanical vibrations are the cause of substantial operational and safety related problems with many mechanical systems of major importance, in particular in transportation, energy production, and industry. This project aims towards the development of new mathematical techniques to systematically investigate the dependence of vibrations on model parameters (e.g. bearing or material coefficients). To achieve this, equation-free techniques (also called coarse analysis) will be used which allow to obtain an understanding of the dynamic behaviour on a macroscopic scale by disregarding large amounts of unimportant information on the microscopic scale. The method fills the gap between time simulations of complex numerical models, such as nonlinear finite element models (FEM), and stability and bifurcation analyses with much simpler analytical models. The reason is that it enables such informative analyses directly on the complex microscopic models without the (often approximative) derivation of equations of motion on a macroscopic level. Due to the high-dimensional variable and parameter spaces and resulting computational costs, it is not possible to obtain similar information by direct simulations. The scientific goal is to clarify the potential of this approach within an important area of mechanics, rotating machinery (e.g. a turbocharger), where the detailed understanding of time dependent complex models play important roles in the design process.

Department of Mathematics
Department of Mechanical Engineering
Fluid Optimisation Workflows for Highly Effective Automotive Development Processes

The automotive industry has recently seen a paradigmatic shift from design processes based on physical prototypes to a computationally aided product development process (PDP) based on virtual prototypes. To maintain the competitiveness of European car manufacturers, a significant reduction of lead development time is required. The main potential for improvement lies in further exploitation of virtual development and especially in further automation of these virtual processes through optimal design techniques. Optimal design techniques are mature and are being used in structural mechanics in the automotive industry, as well as in computational fluid dynamics (CFD) in the aeronautical industry. However, this potential has not yet been realised for CFD in the automotive industry. To integrate these methods into workflows within the routine PDP, the project will make advances with adjoint sensitivity methods, mesh-based and CAD-based shape optimisation, high-Reynolds number topology optimisation. Complete CFD optimisation workflows, i.e. chains of optimisation techniques adapted to the automotive processes for the early as well as later stages of development will be integrated into the PDP. Aspects of process stability, data management, storage, numerical efficiency will be addressed in conjunction with an analysis of current PDP practices. The current practices of organising the PDP will be analysed, the areas of potential for optimisation workflows identified and where necessary alterations of the PDP will be made. Key use cases within the design process defined by the two car manufacturers in the project will be demonstrated and the resulting reduction in lead time will be validated. European SMEs play a leading role in developing the software tools for the PDP and in supporting the car manufacturers in implementing these tools in their PDPs. Three SMEs with a track record of working with the automotive industry are partners in the project.

Department of Mathematics
Queen Mary University of London
CD-adapco
ESI Group S.A.
FE-Design GmbH
ICON Computer Graphics Ltd.
Renault S.A.S.
Technische Universität München
Technical University of Sofia
Volkswagen AG
Warsaw University of Technology
Period: 01/02/2009 → 31/01/2012
Number of participants: 14
Acronym: Flowhead
Contact person:
Zellat, Marc (Ekstern)
Megahed, Mustafa (Ekstern)
Sauter, Juergen (Ekstern)
de Villiers, Eugene (Ekstern)
Sidorkiewicz, Maryan (Ekstern)
Project participant:
Evgrafov, Anton (Intern)
Gersborg, Allan Roulund (Intern)
Gregersen, Misha Marie (Intern)
Todorov, Georgi (Ekstern)
Othmer, Carsten (Ekstern)
Project Manager, organisational:
Mueller, Jens-Dominik (Ekstern)
Sørensen, Mads Peter (Intern)
Bletzinger, Kai-Uwe (Ekstern)
Rokicki, Jacek (Ekstern)

Financing sources
Source: Forsk. EU - Rammeprogram
Name of research programme: Forsk. EU - Rammeprogram
Amount: 2,500,000.00 Danish Kroner
Project

Iso-geometric analysis and shape optimization in fluid mechanics
Department of Mathematics
Period: 01/02/2009 → 30/04/2012
Number of participants: 6
Phd Student:
Nørtoft, Peter (Intern)
Supervisor:
Pedersen, Niels Leergaard (Intern)
Main Supervisor:
Gravesen, Jens (Intern)
Examiner:
Stolpe, Mathias (Intern)
Bazilevs, Yuri (Ekstern)
Jüttler, Bert (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU)
Project: PhD

Development of tools for logbook and VMS data analysis (38751)
Objectives and Background
The project “Development of tools for logbook and VMS data analysis” was an EU project under studies for carrying out the common fisheries policy (No MARE/2008/10 Lot2). The aim of the project was to develop a set of standard protocols for coupling and simultaneous analyses of EU fisheries logbook and VMS satellite vessel record data.
Tasks and Deliverables
The process began with the construction of standardized data formats for logbook (EFLALO) and VMS (TACSAT). The software for analyzing the data took the form of a fully documented package called vmstools, built using the freeware package, R (http://cran.rproject.org/). Once the data have been imported into R in the correct format, a series of R programs or functions, linked by scripts enable all tasks necessary to be completed in a single software environment. The software can ‘clean’ data and format input data, estimate distances between VMS positions, and métiers can be identified objectively from species assemblages in catch data using multivariate statistical techniques.
We have included a range of complimentary methods for determining fishing activity from VMS position registrations. Positions at sea, for example, can be distinguished from vessels in harbor or erroneous positions on land. Position registrations of vessels actually fishing can be separated from those engaged in other activities (e.g. steaming) using their speed in conjunction with other information such as vessel size and gear being used.
Logbook and VMS data can be merged such that high-resolution spatial maps of catches of various commercial species can be generated. Individual vessel tracks can be reconstructed for more realism through different interpolation techniques (both linear and non-linear, i.e. using Hermite spline functions). Further, all the fishing activity indicators required under the Data Collection Framework can be calculated using vmstools. The package can also be used to explore the impact of different spatial (grid size) and temporal aggregations (month, quarterly, annual) which need to be explicitly considered when assessing fishing impact on the sea floor. There are also scripts for displaying results using Google Earth which is a useful aid for dissemination.
The combination of all these routines ‘under one roof’ permitted and permits the construction of ‘Regional’ databases (i.e. FishFrame developed by DTU Aqua - a regional database hosted by one of the project partners) and scripts to produce output suitable for this are included with the vmstools package.
As proof of concept, all analyses performed within each work package have been tested, using the vmstools package, against national datasets with contributions from the French, Danish, Irish, UK and Dutch institutes. As an example, FishFrame has been populated with Dutch and Danish combined VMS and logbook data for 2005-2009.
The project demonstrated emphatically that logbook and VMS data from disparate countries with often different data collection regimens can be combined and compared using generic tools and that the output can be sent to regional databases permitting more holistic assessments of fishing activity.
The project has built further on the networks and platforms produced under EU FP6 EFIMAS Project coordinated by DTU Aqua, and the DTU Aqua team associated with the project has produced several peer reviewed journal papers under Lot 2.
The project is coordinated by Institute for Marine Resources and Ecosystem Studies (IMARES), Wageningen UR, The Netherlands.
This project is funded by EU, Framework Programme 7.

Software Engineering
National Institute of Aquatic Resources
Section for Ecosystem based Marine Management
Wageningen IMARES
Cefas
IFREMER
Marine Scotland
Sea Fisheries Institute

Marine Institute
Period: 01/01/2009 → 31/12/2012
Number of participants: 5
Research areas: Fisheries Management & Marine Living Resources
Project participant:
Bastardie, Francois (Intern)
Ulrich, Clara (Intern)
Egekvist, Josefine (Intern)
Degel, Henrik (Intern)
Project Manager, academic:
Nielsen, J. Rasmus (Intern)

NonLinear modelling for energy systems
Department of Informatics and Mathematical Modeling
Period: 01/01/2009 → 22/03/2013
Number of participants: 6
Phd Student:
Trombe, Pierre-Julien (Intern)
Supervisor:
Pinson, Pierre (Intern)
Main Supervisor:
Madsen, Henrik (Intern)
Examiner:
Larsen, Rasmus Werner (Intern)
Greiner, Martin O. W. (Ekstern)
Thorarinsdottir, Thordis L. (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU) Samf.
Project: PhD

Computation of Superconducting Wind Turbine Generators
Department of Mathematics
Period: 15/12/2008 → 24/05/2012
Number of participants: 8
Phd Student:
Rodriguez Zermeno, Victor Manuel (Intern)
Supervisor:
Anbarasu, Ramasamy (Ekstern)
Kjaer, Philip Carne (Ekstern)
Pedersen, Niels Falsig (Intern)
Main Supervisor:
Serensen, Mads Peter (Intern)
Examiner:
Engsig-Karup, Allan Peter (Intern)
Campbell, Archibald M. (Ekstern)
Grilli, Francesco (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: 1/3 FUU, 1/3 inst 1/3 Andet
Project: PhD

Integrative multimodal brain imaging
Department of Informatics and Mathematical Modeling
Period: 15/12/2008 → 30/04/2012
Number of participants: 6
Phd Student:
Rasmussen, Peter Mondrup (Intern)
Supervisor:
Lund, Torben E. (Ekstern)
Madsen, Kristoffer Hougaard (Intern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Larsen, Jan (Ekstern)
Siebner, Hartwig R. (Ekstern)

Financing sources
Source: Internal funding (public)
**Billeder som objektivt mål for fødevarekvalitet**

Department of Informatics and Mathematical Modeling  
Period: 01/12/2008 → 19/04/2013  
Number of participants: 7  
Phd Student:  
Møller, Flemming (Intern)  
Supervisor:  
Carstensen, Jens Michael (Intern)  
Olesen, Susanne K. (Ekstern)  
Main Supervisor:  
Larsen, Rasmus (Intern)  
Examiner:  
Conradsen, Knut (Intern)  
Hansen, Per W. (Ekstern)  
Parker, Alan (Ekstern)

**Financing sources**  
Source: Internal funding (public)

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**Cranio-facial growth modelling**

Department of Informatics and Mathematical Modeling  
Period: 01/12/2008 → 24/05/2013  
Number of participants: 9  
Phd Student:  
Thorup, Signe Strann (Intern)  
Supervisor:  
Darvann, Tron Andre (Intern)  
Hermann, Nuno (Ekstern)  
Kreiborg, Sven (Ekstern)  
Paulsen, Rasmus Reinhold (Intern)  
Main Supervisor:  
Larsen, Rasmus (Intern)  
Examiner:  
Ersbøll, Bjarne Kjær (Intern)  
Rueckert, Daniel (Ekstern)  
Østergaard, Lasse Riis (Ekstern)

**Financing sources**  
Source: Internal funding (public)

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**Motion Correction on High resolution Brain PET Imaging**

Department of Informatics and Mathematical Modeling  
Period: 15/11/2008 → 20/01/2012  
Number of participants: 8  
Phd Student:  
Olesen, Oline Vinter (Intern)  
Supervisor:  
Hejgaard, Liselotte (Intern)  
Paulsen, Rasmus Reinhold (Intern)  
Roed, Bjarne (Ekstern)
Main Supervisor:
Larsen, Rasmus (Intern)
Examiner:
Conradsen, Knut (Intern)
Bentzen, Søren Møller (Ekstern)
Reyes, Mauricio (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: ErhvervsPhD-ordningen VTU
Project: PhD

Challenges to safety posed by outsourcing and sub-contracting of critical tasks
iNTeg-Risk - Early Recognition, Monitoring and Integrated Management of Emerging, New Technology related Risks

COWI partner med DTU, Henning Boje Andersen
Department of Applied Mathematics and Computer Science
Period: 01/11/2008 → 31/05/2013
Number of participants: 1
Acronym: iNTeg-Risk
Project participant:
Hedlund, Frank Huess (Intern)

Modeling and Forecasting for Optimal Participation of Renewable Energy in Deregulated Energy Markets

Department of Informatics and Mathematical Modeling
Period: 01/11/2008 → 24/08/2012
Number of participants: 7
Phd Student:
Jónsson, Tryggvi (Intern)
Supervisor:
Nielsen, Torben Skov (Intern)
Poulsen, Niels Kjølstad (Intern)
Main Supervisor:
Pinson, Pierre (Intern)
Examiner:
Kulahci, Murat (Intern)
McSharry, Patrick E. (Ekstern)
Meibom, Peter (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: ErhvervsPhD-ordningen VTU
Project: PhD

Post quantum cryptology

Department of Mathematics
Period: 01/11/2008 → 21/12/2011
Number of participants: 6
Phd Student:
Gauthier Umana, Valérie (Intern)
Supervisor:
Leander, Gregor (Intern)
Main Supervisor:
Knudsen, Lars Ramkilde (Intern)
Examiner:
Beelen, Peter (Intern)
Canteaut, Anne Michele (Intern)
Johansson, Thomas (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU) Samf.
Project: PhD

Sensometrics: Thurstonian and Statistical Models
Department of Informatics and Mathematical Modeling
Period: 01/11/2008 → 24/08/2012
Number of participants: 5
Phd Student:
Christensen, Rune Haubo Bojesen (Intern)
Main Supervisor:
Brockhoff, Per B. (Intern)
Examiner:
Madsen, Henrik (Ekstern)
Meyners, Michael (Ekstern)
Skovgaard, Ib Michael (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU)
Project: PhD

Mathematical methods in complex systems: International Toyota CRDL Workshop
The workshop is organized by the Technical University of Denmark (DTU) with organizers Jens Starke (DTU), Viktor Jirsa (CNRS) and Thomas Brenner (University of Marburg) in cooperation with Toyota Central R&D Labs. (TCRDL). This is the third workshop in a series. The first Toyota workshop was organized in 2006 in Denmark, the second in 2007 in Austria. The workshop concentrates on mathematics itself, neuro-science and economics. The invited talks should address these topics either directly or should discuss methods with potential applications. The workshop intends to bring together experts from theory and experiments/practice to provide in a close circle a platform for fruitful discussions and also possible cooperations. Program: Takahiro Shiga (Toyota CRDL, Japan): "Math for better Mobility", Gemma Calvert (Warwick, UK): "The application of cognitive neuroscience techniques to industry", Jonathan Rubin (Pittsburgh, USA): "Some insights into central pattern generator activity patterns", Giulio Bottazzi (Scuola Superiore Sant'Anna, Pisa, Italy): "Market Equilibria under Procedural Rationality", Hans Georg Bock (University of Heidelberg, Germany): "Efficient Methods for Parameter Estimation and Optimum Experimental Design for Dynamic Processes", James Lu (Austrian Academy of Sciences, Linz, Austria): "Inverse bifurcation analysis with sparsity-promoting regularization", Olivier Oullier (Marseille, France): "Non-equivalence between levels of description in social neuroeconomics", Yuri Gaididei (Kiev, Ukraine): "Complex spatiotemporal behavior in driven asymmetrically coupled nonlinear elements", Ioannis Kevrekidis (Princeton, USA): "Coarse graining and the acceleration of agent/network based computations", Mario Maggioni (Università Cattolica del Sacro Cuore, Italy): "Modelling firms clusters learning mechanism and transaction costs", Reinoud Bootsma (Marseille, France): "Information and dynamics in goal-directed action", Mads P. Sørensen (Technical University of Denmark): "Stochastic and coherent dynamics of single and coupled beta cells", Gustavo Deco (Barcelona, Spain): "Stochastic dynamics as a principle of perception", Edriss S. Titi (University of California, Irvine and Weizmann, USA): "Turbulence - a Paradigm of Complex System".

Department of Mathematics
Toyota Central Research and Development Lab
Period: 15/10/2008 → 17/10/2008
Number of participants: 1
Project participant:
Starke, Jens (Intern)

Financing sources
Source: Sam.arb.aftaler - Udenlandske offentlige og private
Name of research programme: Sam.arb.aftaler - Udenlandske offentlige og private
Amount: 415,335.00 Danish Kroner
Project
Machine Learning and Signal Processing in Miniaturized Sensor for Explosive Detection

Department of Informatics and Mathematical Modeling
Period: 01/10/2008 → 17/06/2013
Number of participants: 5
Phd Student: Alstrøm, Tommy Sonne (Intern)
Main Supervisor: Larsen, Jan (Intern)
Examiner: Hansen, Lars Kai (Intern)
Kidmose, Preben (Intern)
Mandic, Danilo P. (Eksterm)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering
Project: PhD

Model based analysis of ethnic differences in Type 2 diabetes

Department of Informatics and Mathematical Modeling
Period: 01/10/2008 → 24/08/2012
Number of participants: 7
Phd Student: Møller, Jonas Bech (Intern)
Supervisor: Ingwersen, Steen Hvass (Eksterm)
Overgaard, Rune Viig (Intern)
Main Supervisor: Madsen, Henrik (Intern)
Examiner: Brockhoff, Per B. (Intern)
Jacqmin, Philippe (Eksterm)
Madsbad, Sten (Eksterm)

Financing sources
Source: Internal funding (public)
Name of research programme: ErhvervsPhD-ordningen VTU
Project: PhD

Models for efficient integration of solar energy

Department of Informatics and Mathematical Modeling
Period: 01/10/2008 → 24/08/2012
Number of participants: 6
Phd Student: Bacher, Peder (Intern)
Supervisor: Nielsen, Henrik Aalborg (Intern)
Madsen, Henrik (Intern)
Examiner: Christiansen, Lasse Engbo (Intern)
Palsson, Olafur Petur (Intern)
Taboada, Maria Jose Jimenez (Eksterm)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU) Samf.
Project: PhD
Oprational Shape Description
Department of Informatics and Mathematical Modeling
Period: 01/10/2008 → 21/12/2011
Number of participants: 7
Phd Student:
Welnicka, Katarzyna (Intern)
Supervisor:
Aanæs, Henrik (Intern)
Larsen, Rasmus (Intern)
Main Supervisor:
Bærentzen, Jakob Andreas (Intern)
Examiner:
Conradsen, Knut (Intern)
P. Kobbelt, Leif (Ekstern)
Østergaard, Lasse Riis (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU)
Project: PhD

HEROS in mathematics - a new way of learning
Department of Mathematics
Department of Informatics and Mathematical Modeling
Period: 01/09/2008 → 31/08/2010
Number of participants: 3
Project participant:
Sendrup, Linda (Intern)
Schmidt, Karsten (Intern)
Project Manager, organisational:
Rootzén, Helle (Intern)

Financing sources
Source: Forskningsprojekter - Andre ministerier og styrelser
Name of research programme: Forskningsprojekter - Andre ministerier og styrelser
Amount: 3,122,478.00 Danish Kroner
Project

Mathematical modelling and analysis of marine ecological systems with stage structures and size spectrums
Department of Mathematics
Period: 01/09/2008 → 23/02/2012
Number of participants: 7
Phd Student:
Zhang, Lai (Intern)
Supervisor:
Andersen, Ken Haste (Intern)
Thygesen, Uffe Høgsbro (Intern)
Main Supervisor:
Knudsen, Kim (Intern)
Examiner:
Starke, Jens (Intern)
25_NN_Studenter/Øvrige medarb. (Ekstern)
Delius, Gustav W. (Ekstern)

Financing sources
Source: Internal funding (public)
Mining of Ship Operation Data for Energy Conservation

Department of Informatics and Mathematical Modeling
Period: 01/09/2008 → 11/04/2012
Number of participants: 6
Phd Student:
Petersen, Jóan Petur (Intern)
Supervisor:
Jacobsen, Danjal Jakup (Intern)
Main Supervisor:
Winther, Ole (Intern)
Examiner:
Larsen, Jan (Ekstern)
Bertram, Volker (Ekstern)
Ohlsson, Mattias (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU) Samf.
Project: PhD

Analysis and Optimization of Embedded Systems

Department of Informatics and Mathematical Modeling
Period: 01/08/2008 → 30/11/2010
Number of participants: 3
Phd Student:
Saraswat, Prabhat Kumar (Intern)
Supervisor:
Madsen, Jan (Intern)
Main Supervisor:
Pop, Paul (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU) Samf.
Project: PhD

E-learning project HEROS for first year math - new ways of learning

The aim of this project is to develop a new web based learning platform for the course Engineering Mathematics 1 – a platform which combines cutting edge e-learning materials and strategies with lectures, textbooks, weekly menus, and Maple demos. The main task is to further support the multifaceted architecture of the course while still keeping it clear cut and transparent. The idea is to make room within this architecture for several interlinked teaching styles and teaching materials and thus enhance the possibility for the individual student to find and operate his or her own most effective learning style. New “nonlinear” learning objects including text files, animations, video clips etc. will be developed and packed in order to create multiple entries into the process of understanding the key mathematical concepts.

Mathematical Statistics

Department of Informatics and Mathematical Modeling

Geometry

LearningLab DTU

Administration
Period: 01/08/2008 → 31/07/2010
Number of participants: 4
Project ID: 15647
Post quantum crytology: New Cryptology
Project with support from Villum Kann Rasmussen Fonden. In collaboration with Ivan Damgaard, Aarhus University

Department of Mathematics
Period: 01/08/2008 → 31/07/2012
Number of participants: 4
Project participant:
Gauthier Umana, Valérie (Intern)
Thomsen, Søren Steffen (Intern)

Project Manager, organisational:
Knudsen, Lars Ramkilde (Intern)
Leander, Gregor (Intern)

Financing sources
Source: Forsk. Private danske - Fonde
Name of research programme: Forsk. Private danske - Fonde
Amount: 4,200,000.00 Danish Kroner

SHA-3 hash function
Standard hash functions are used for efficient and secure information processing in many commercial applications. In the wake of successful cryptanalysis of several standard hash functions and their impact on the security of the several information processing applications, National Institute of Standards and Technology (NIST), USA has announced an international public competition to select the most secure and efficient hash function as the Advanced Hash Standard which will be referred to as SHA-3. The SHA-3 hash function augments the current secure hash standard FIPS 180-2 issued by NIST in 2002 and can be directly substituted for the hash functions in the FIPS 180-2 standard in the applications. Rigorous analysis of AHS submissions is quite essential in eliminating ineffective proposals and consequently in successful completion of the competition to select a hash function standard that would be capable of protecting the sensitive information for a foreseeable future. This research project aims to contribute to the selection of the new hash standard by carrying out the Analysis of some of the latest hash function designs and their applications in addition to the analysis of some of the hash function submissions to the AHS.

Department of Informatics and Mathematical Modeling

Department of Mathematics
Period: 01/08/2008 → 31/07/2009
Number of participants: 2
Hash functions, cryptanalysis, design, Advanced Hash Standard and NIST
Project ID: 274-08-0052
Project Manager, organisational:
Gauravaram, Praveen (Intern)
Knudsen, Lars Ramkilde (Intern)

Financing sources
Source: Forskningsrådene - Andre
Name of research programme: Forskningsrådene - Andre
Amount: 770,175.00 Danish Kroner
Adaptability and Autonomy in Embedded Systems
Department of Informatics and Mathematical Modeling
Period: 01/06/2008 → 28/09/2011
Number of participants: 6
Phd Student: Boesen, Michael Reibel (Intern)
Supervisor: Pop, Paul (Intern)
Main Supervisor: Madsen, Jan (Intern)
Examiner: Sparsø, Jens (Intern)
Codinachs, David Merodio (Ekstern)
Tempesti, Gianluca (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Offentlig finansiering
Project: PhD

Constructing IT and Healthcare
Department of Informatics and Mathematical Modeling
Period: 01/05/2008 → 01/05/2012
Number of participants: 4
Acronym: CITH-Co
Project participant: Bansler, Jørgen P. (Intern)
Kensing, Finn (Ekstern)
Schmidt, Kjeld (Ekstern)
Project Manager, organisational: Havn, Erling C. (Intern)

Financing sources
Source: Forsk. Andre statslige danske i øvrigt
Name of research programme: Forsk. Andre statslige danske i øvrigt
Amount: 7,882,969.00 Danish Kroner
Project

Diplomingeniøruddannelse i Sundhedsteknologi
Udvikling af Diplomingeniøruddannelse i Sundhedsteknologi.

Relations:
Activities: Sundhedsteknologi - metoder, praksis og perspektiver

Center for Bachelor of Engineering Studies
Center for Information Technology and Electronics
Department of Electrical Engineering
Department of Applied Mathematics and Computer Science
Center for Continuing Education
Office for Study Programmes and Student Affairs
Center for Business and Innovation
Period: 01/05/2008 → 31/12/2012
Number of participants: 13
Sundhedsteknologi, Telemedicin, Nye teknologiske platforme
Project participant: Sørensen, John Aasted (Intern)
Baden-Kristensen, Keld (Intern)
Holst-Christensen, Bo (Intern)
Sørensen, John Kryger (Intern)
Munck-Fairwood, Roger (Intern)
Bechmann, Henrik (Intern)
Hauge, Anders (Intern)
Olesen, Per (Intern)
Jeppesen, Lau (Ekstern)
Tolstrup, Jytte (Ekstern)
Pilegaard, Marianne (Ekstern)
Working partner:
Lausten, Anette Kjeldal (Ekstern)
Besenbacher, Bente (Ekstern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: Ingeniørhøjskolen i København
Amount: 1,200,000.00 Danish Kroner

**Knowledge Discovery in Neuroinformatics**
Department of Informatics and Mathematical Modeling
Period: 01/05/2008 → 30/11/2011
Number of participants: 5
Phd Student:
Wilkowski, Bartlomiej (Intern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Larsen, Jan (Ekstern)
Andreasen, Troels (Ekstern)
Honkela, Timo (Ekstern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: 1/3 DTU-stip, 2/3 FUR/andet
Project: PhD

**New vision technology for multidimensional quality monitoring of food processes**
Department of Informatics and Mathematical Modeling
Period: 01/05/2008 → 31/08/2011
Number of participants: 6
Phd Student:
Dissing, Bjørn Skovlund (Intern)
Supervisor:
Adler-Nissen, Jens (Intern)
Main Supervisor:
Ersbøll, Bjarne Kjær (Intern)
Examiner:
Jørgensen, Bo Munk (Intern)
Christensen, Lars Bager (Intern)
Parkkinen, Jussi (Ekstern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: 1/3 DTU-stip, 2/3 FUR/andet
Project: PhD
Solar/electric heating systems in the future energy system

The two most powerful renewable energy sources are solar and wind energy. It is expected that an increasing part of our electricity consumption in the future will be covered by wind farms. This will result in an increased number of windy periods with a surplus of electricity and thereby a low electricity price. A concept where individual solar heating systems optimised for making use of electricity produced by wind turbines in these periods can facilitate the introduction of wind energy in large scale into the energy system and thereby contribute to increasing the part of our energy consumption covered by renewable energy sources. The heat is produced by the solar heating system and by the electric heating element(s)/heat pump, which, if possible, only should be in operation in periods where the solar heating system cannot fully cover the heat demand and where the electricity price is low, e.g. in windy periods with a high electricity production from wind turbines. The unit is equipped with a smart heat storage (variable auxiliary volume) and a smart control system based on prognosis for the electricity price, the heat demand of the house, the solar heat production of the solar heating system and weather forecasts. The project will elucidate how best to design an individual heating unit for one family houses based on the above principles. It is also elucidated how suitable the heating unit is for the home owner and for our future energy system. Different designs of the heating unit and the control system will be investigated and the most promising solutions tested experimentally. It is expected that the heating unit is more cost efficient than traditional solar heating systems and that it can be an attractive alternative to oil- and natural gas boilers, both from an economy and environmental point of view.

Section for Building Physics and Services

Department of Civil Engineering

Department of Informatics and Mathematical Modeling
**Department of Mathematics**

**ENFOR A/S**

**Danish Meteorological Institute**

**AllSun A/S**

**COWI A/S**

- Period: 01/04/2008 → 31/12/2011
- Number of participants: 5
- Project ID: 25869
- Project participant:
  - Perers, Bengt (Intern)
  - Andersen, Elsa (Intern)
  - Fan, Jianhua (Intern)
  - Bacher, Peder (Intern)

**Project Manager, organisational:**
- Furbo, Simon (Intern)

**Financing sources**
- Source: Forskningsrådene - Andre
- Name of research programme: Forskningsrådene - Andre
- Amount: 7,406,236 Danish Kroner

**A Framework for Constraint-Programming based Configuration**

**Department of Informatics and Mathematical Modeling**

- Period: 01/03/2008 → 28/09/2011
- Number of participants: 7
- Phd Student:
  - Queva, Matthieu Stéphane Benoit (Intern)

**Supervisor:**
- Clausen, Jens (Intern)
- Ricci, Laurent (Ekstern)

**Main Supervisor:**
- Probst, Christian W. (Intern)

**Examiner:**
- Fischer, Paul (Intern)
- Felfernig, Alexander (Ekstern)
- Hotz, Lothar (Ekstern)

**Financing sources**
- Source: Internal funding (public)
- Name of research programme: ErhvervsPhD-ordningen VTU

**Project: PhD**

**Preconditioned Iterative Solvers for Image Reconstructions**

**Department of Informatics and Mathematical Modeling**

- Period: 01/03/2008 → 30/11/2008
- Number of participants: 2
- Phd Student:
  - Nasar, Noreen (Intern)

**Main Supervisor:**
- Hansen, Per Christian (Intern)

**Financing sources**
- Source: Internal funding (public)
- Name of research programme: Forskningsrådsfinansiering

**Project: PhD**
Machine Learning for Integrating Biological Data Across Experimental Technologies

Department of Informatics and Mathematical Modeling
Period: 15/02/2008 → 01/06/2011
Number of participants: 5
Phd Student:
Henao, Ricardo (Intern)
Main Supervisor:
Winther, Ole (Intern)
Examiner:
Hansen, Lars Kai (Intern)
Girolami, Mark (Ekstern)
Vehtari, Aki (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU) Samf.
Project: PhD

Probabilistic Methods for Biomedical Signals

Department of Informatics and Mathematical Modeling
Period: 15/02/2008 → 31/08/2011
Number of participants: 6
Phd Student:
Stahlhut, Carsten (Intern)
Supervisor:
Winther, Ole (Intern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Larsen, Jan (Ekstern)
Müller, Klaus-Robert (Ekstern)
Sörnmo, Leif (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU)
Project: PhD

A Framework for Modeling, Simulation and Design Space Exploration of Digital Microfluidic Biochips

Department of Informatics and Mathematical Modeling
Period: 01/02/2008 → 31/08/2011
Number of participants: 6
Phd Student:
Maftei, Elena (Intern)
Supervisor:
Madsen, Jan (Intern)
Main Supervisor:
Pop, Paul (Intern)
Examiner:
Nannarelli, Alberto (Intern)
Chakrabarty, Krishnendu (Ekstern)
Peng, Zebo (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU)
Project: PhD
An open database of 3D scans of the human head, ear, and torso

The aim of this project is to generate a database of high-resolution 3D scans of the head and torso of humans. The data will be presented on a web-portal where software to view, manipulate and process the data is also available. The intended users of the data and tools are students and researchers working with acoustical modelling. Specifically, the data can for example be used to optimise spatial perception in hearing aids, boom design for headsets, and simulating individual head related transfer functions. Mathematical modelling of the sound field surrounding the head is an emerging discipline that has shown promise to alleviate some of the difficulties in for example designing and testing the performance of new hearing aid designs. However, current state-of-the arts methods are mostly based on synthetic data and the results are therefore somewhat misleading. The lack of data is mainly due to the difficulty in acquiring real 3D data of the human head and torso. Especially, the 3D geometry of the human ear is very difficult to obtain using traditional 3D acquisition techniques like CT, MR, and laser scanning. Recently, the 3D Laboratory at the school of dentistry at the University of Copenhagen obtained a 3dMD cranial scanner by a donation from the Oticon Foundation. This scanner can be used to capture high quality 3D scans of the head, ear (pinna and part of concha), and torso of humans. The aim of this project is to use the scanner at the 3D laboratory to capture the torso and head geometry of a group of test persons. Furthermore, ear impressions should be taken and scanned so the final and merged data is a precise 3D presentation of torso, head, and the ear canal.

Department of Informatics and Mathematical Modeling
Period: 01/02/2008 → 01/03/2011
Number of participants: 1
Acronym: OpenHATS
Project Manager, organisational:
Paulsen, Rasmus Reinhold (Intern)

Financing sources
Source: Forsk. Private danske - Fonde
Name of research programme: Forsk. Private danske - Fonde
Amount: 1,000,000.00 Danish Kroner

Integrating Design Decision Management with Model-based Software Development

Department of Informatics and Mathematical Modeling
Period: 01/02/2008 → 01/06/2011
Number of participants: 6
Phd Student:
Könemann, Patrick (Intern)
Supervisor:
Baumeister, Hubert (Intern)
Main Supervisor:
Kindler, Ekkart (Intern)
Examiner:
Störrle, Harald (Intern)
Babar, Muhammad Ali (Ekstern)
Paige, Richard F. (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU)
Project: PhD

Analysis of Body-Vortex Interactions

Department of Mathematics
Period: 01/01/2008 → 30/03/2011
Number of participants: 6
Phd Student:
Pedersen, Johan Rønby (Intern)
Supervisor:
Aref, Hassan (Intern)
Main Supervisor:
Brøns, Morten (Intern)
Examiner:
Bohr, Tomas (Intern)
Eckhardt, Bruno (Ekstern)
Williamson, Charles H. K. (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU) Samf.
Project: PhD

Cryptanalysis of Symmetric Cryptographic Algorithms by means of Numerical Methods
Department of Mathematics
Period: 01/01/2008 → 02/03/2011
Number of participants: 5
Phd Student:
Borghoff, Julia (Intern)
Main Supervisor:
Knudsen, Lars Ramkilde (Intern)
Examiner:
Beelen, Peter (Intern)
Johansson, Thomas (Ekstern)
Rijmen, Vincent (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering
Project: PhD

Cryptanalysis of symmetric-key ciphers : by means of Numerical Methods
Department of Mathematics
Period: 01/01/2008 → 31/12/2010
Number of participants: 3
Project participant:
Borghoff, Julia (Intern)
Matusiewicz, Krystian (Intern)
Project Manager, organisational:
Knudsen, Lars Ramkilde (Intern)

Financing sources
Source: Forskningsrådene - STVF
Name of research programme: Forskningsrådene - STVF
Amount: 2,400,000.00 Danish Kroner
Project

Image Analysis of Food Quality
Department of Informatics and Mathematical Modeling
Period: 01/01/2008 → 28/09/2011
Number of participants: 7
Phd Student:
Arngren, Morten (Intern)
Supervisor:
Hansen, Per W. (Ekstern)
Larsen, Rasmus (Intern)
Main Supervisor:
Larsen, Jan (Intern)
Examiner:
Hansen, Lars Kai (Intern)
van den Berg, Frans W.J. (Intern)
Dias, Jose M. Bioucas (Ekstern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: ErhvervsPhD-ordningen VTU
Project: PhD

**Landscape genetics methods in fresh water biology : Genestream**
Department of Informatics and Mathematical Modeling
Portugal Science Foundation
Period: 01/01/2008 → 31/12/2010
Number of participants: 0
Project

**Numerical Methods for Simulation and Optimization of Enhanced Oil Recovery Methods**
Department of Informatics and Mathematical Modeling
Period: 01/01/2008 → 24/08/2012
Number of participants: 6
Phd Student: Völcker, Carsten (Intern)
Supervisor: Thomsen, Per Grove (Intern)
Main Supervisor: Jørgensen, John Bagterp (Intern)
Examiner: Engsig-Karup, Allan Peter (Intern)
Foss, Bjarne Anton (Ekstern)
Kristensen, Morten Rode (Intern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering
Project: PhD

**Optimizing the control of foot-and-mouth disease in Denmark by simulation**
Section for Veterinary Epidemiology and public sector consultancy
Division of Veterinary Diagnostics and Research
National Veterinary Institute
DTU Data Analysis
Department of Informatics and Mathematical Modeling
University of Copenhagen
University of California at Davis
Danish Veterinary and Food Administration
United States Department of Agriculture
Danish Meat Association
Danish Cattle Federation
Period: 01/01/2008 → 31/12/2011
Number of participants: 12
Project ID: 22314
Contact person: Christiansen, Lasse Engbo (Intern)
Spanning trees in cubic graphs

The number of spanning trees, acyclic orientations, and totally cyclic orientations are examples of evaluations of the Tutte polynomial which plays a central role in statistical mechanics. In the present project we investigate a conjecture of Merino and Welsh on the interplay between these invariants.

Department of Mathematics

Technical University of Denmark

Period: 01/01/2008 → 31/12/2009

Number of participants: 2

Project participant:
Thomassen, Carsten (Intern)
Cameron, Peter (Ekstern)

Financing sources

Source: Forskningsprojekter - Fødevareministeriet
Name of research programme: Forskningsprojekter - Fødevareministeriet
Amount: 4,822,468.00 Danish Kroner

Project
Power and Thermal Management of System-on-chips
Department of Informatics and Mathematical Modeling
Period: 15/10/2007 → 01/06/2011
Number of participants: 6
Phd Student:
Liu, Wei (Intern)
Supervisor:
Madsen, Jan (Intern)
Main Supervisor:
Nannarelli, Alberto (Intern)
Examiner:
Pop, Paul (Intern)
Alonso, David Atienza (Ekstern)
Tisserand, Arnaud (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

3D deformation of objects with singularities
Department of Informatics and Mathematical Modeling
Period: 01/10/2007 → 02/02/2011
Number of participants: 4
Phd Student:
Misztal, Marek Krzysztof (Intern)
Examiner:
Larsen, Rasmus Werner (Intern)
Bargteil, Adam W. (Ekstern)
Sørensen, Thomas Sangild (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Analysis and Modelling of Chain Data
Department of Informatics and Mathematical Modeling
Period: 01/10/2007 → 05/09/2014
Number of participants: 5
Phd Student:
Kotwa, Ewelina Katarzyna (Intern)
Main Supervisor:
Brockhoff, Per B. (Intern)
Examiner:
Kulahci, Murat (Intern)
Rinnan, Åsmund (Ekstern)
Westad, Frank Ove (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Globaliseringsmidler
Project: PhD

Formal Ontologies + Natural language semantics = Ontological semantics
Department of Informatics and Mathematical Modeling
Period: 01/10/2007 → 22/06/2011
Number of participants: 6
Phd Student:
Szymczak, Bartlomiej Antoni (Intern)
Supervisor:
Jensen, Per Anker (Ekstern)
Main Supervisor:
Nilsson, Jørgen Fischer (Intern)
Examiner:
Villadsen, Jørgen (Intern)
Dybkjær, Hans (Ekstern)
Lenci, Alessandro (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU, Samfinansiering
Project: PhD

Global Optimization for Topology Design of Metallic Microstrips – Implementation and Numerical Experiments
Department of Mathematics
Toyota Central Research & Development Laboratories, Inc.
Period: 01/10/2007 → 31/03/2008
Number of participants: 3
Project participant:
Stolpe, Mathias (Intern)
Nomura, Tsuyoshi (Ekstern)
Kawamoto, Atsushi (Ekstern)

Financing sources
Source: Sam.arb.aftaler - Udenlandske offentlige og private
Name of research programme: Sam.arb.aftaler - Udenlandske offentlige og private
Amount: 75,000.00 Danish Kroner
Project

Grey box Modelling of Hydraulic Systems
Department of Informatics and Mathematical Modeling
Period: 01/10/2007 → 23/02/2012
Number of participants: 6
Phd Student:
Thordarson, Fannar Órn (Ekstern)
Supervisor:
Madsen, Henrik (Intern)
Main Supervisor:
Madsen, Henrik (Intern)
Examiner:
Poul sen, Niels Kjølstad (Intern)
Rasmussen, Michael Robdrup (Ekstern)
Willems, Patrick (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering
Project: PhD

Periodic wavelet frames
External financed
Department of Mathematics
Topology Optimization for Crashworthiness Design Using Approximate Procedures

Department of Mathematics
Period: 15/09/2007 → 30/03/2011
Number of participants: 6
Phd Student: Amir, Oded (Intern)
Supervisor: Sigmund, Ole (Intern)
Main Supervisor: Stolpe, Mathias (Intern)
Examiner: Evgrafov, Anton (Intern)
Klarbring, Anders (Ekstern)
Lund, Erik (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Geometric Analysis : Classification Theory of Riemannian Submanifolds

The general purpose of this project is to study the influence of curvature on the properties of solutions of certain partial differential equations whose leading symbol is the Laplacian or the p-Laplacian. One key instrument is the curvature controlled comparison of solutions in a given Riemannian (sub-)space with the corresponding solutions in a tailor made model space.

Geometry

Department of Mathematics

Universitat Jaume I
Period: 01/09/2007 → 01/09/2010
Number of participants: 2
Submanifolds, extrinsic balls, radial convexity, radial tangency, mean exit time, isoperimetric inequalities, volume bounds, parabolicity
Project participant:
Markvorsen, Steen (Intern)
Project Manager, organisational: Palmer, Vicente (Ekstern)

Financing sources
Source: Forsk. Andre offentlige og private - Udenlandske
Name of research programme: Forsk. Andre offentlige og private - Udenlandske
Amount: 288,000.00 Danish Kroner
Project

Qualitative and Quantitative Security Analyses for ZigBee Wireless Sensor Networks

Department of Informatics and Mathematical Modeling
Period: 01/09/2007 → 30/03/2011
Number of participants: 6
Phd Student:
Yuksel, Ender (Intern)
Supervisor:
Nielsen, Flemming (Intern)
Main Supervisor:
Nielsen, Hanne Riis (Intern)
Examiner:
Madsen, Jan (Intern)
Gilmore, Stephen (Ekstern)
Martinelli, Fabio (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Verification of Stochastic Process Calculi
Department of Informatics and Mathematical Modeling
Period: 01/09/2007 → 22/06/2011
Number of participants: 7
Phd Student:
Skrypnyuk, Nataliya (Intern)
Supervisor:
Nielsen, Hanne Riis (Intern)
Seidl, Helmut (Ekstern)
Main Supervisor:
Nielsen, Flemming (Intern)
Examiner:
Probst, Christian W. (Intern)
Hankin, Chris (Ekstern)
Hermanns, Holger (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering
Project: PhD

Applications of and statistical inference for Multivariate Matrix Exponential Distributions
Department of Informatics and Mathematical Modeling
Period: 15/08/2007 → 30/03/2011
Number of participants: 6
Phd Student:
Esparza, Luz Judith R (Intern)
Supervisor:
Bladt, Mogens (Intern)
Main Supervisor:
Nielsen, Bo Friis (Intern)
Examiner:
Thygesen, Uffe Hågsbro (Intern)
Casale, Giuliano (Ekstern)
Telek, Miklós (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD
Modelling, Simulation and Optimization of Object-Gripping by Robots

Department of Mathematics
Period: 15/08/2007 → 31/12/2010
Number of participants: 3
Phd Student:
Duen, Marie Bro (Intern)
Supervisor:
Petersen, Henrik Gordon (Ekstern)
Main Supervisor:
Hjorth, Poul G. (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU, Samfinansiering
Project: PhD

3D Printing and Scanning
This project is concerned with the theory and practice of 3D printing and 3D scanning. The project is concretely based upon a donation of a Z450 3D Printer and a Roland LPX 60 scanner from DTU’s Strategic Fund. The purpose is two-fold: To study and optimize 3D color printing and 3D scanning procedures on these platforms and to develop corresponding new assets for teaching, research, and prototyping in mathematics/geometry and applications. Part of the project is to interchange ideas concerning these topics with colleagues from DTU Mechanical Engineering, Informatics, Civil Engineering, and Chemistry. The findings and productions from this project will tentatively be integrated into the activities organized around Matematicum, the mathematical Inspiratorium at DTU Mathematics, as well as into the relevant DTU courses e.g.: 01005 Mathematics 1, 01234 Differential Geometry with Applications, and 02585 Computational Geometry Processing.

Geometry
Department of Mathematics
Period: 01/08/2007 → 01/01/2010
Number of participants: 3
Project ID: Grant from DTU's Strategic Fund 2007
Project participant:
Gravesen, Jens (Intern)
Madsen, Poul-Erik (Intern)
Project Manager, organisational:
Markvorsen, Steen (Intern)

Financing sources
Source: Udenfor rammen
Name of research programme: Ukendt
Amount: 300,000.00 Danish Kroner
Project

Estimation of Conditional densities for predictions in nonlinear stochastic processes - with applications to wind power systems
Department of Informatics and Mathematical Modeling
Period: 01/08/2007 → 12/12/2013
Number of participants: 6
Phd Student:
Tastu, Julija (Intern)
Supervisor:
Pinson, Pierre (Intern)
Main Supervisor:
Madsen, Henrik (Intern)
Examiner:
Poulsen, Niels Kjølstad (Intern)
Kariniotakis, George (Ekstern)
In Silico Models of Blood Coagulation

Department of Mathematics
Period: 01/08/2007 → 20/04/2011
Number of participants: 7
PhD Student:
Andersen, Nina Marianne (Intern)
Supervisor:
Ingwersen, Steen Hvass (Ekstern)
Olsen, Ole Hvilsted (Ekstern)
Main Supervisor:
Sørensen, Mads Peter (Intern)
Examiner:
Jørgensen, John Bagterp (Intern)
Monroe, Dougald M. (Ekstern)
Sosnovtseva, Olga (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

In Silico Models of Blood Coagulation: Industrial ph.d. (Erhvervsforsker)
The overall objective is to develop an in silico model of the blood coagulation system that can be used as a tool for improving the understanding of coagulation processes and supporting the development of new haemostatic agents. The complexity of the modeled system range from systems modeling homogeneous solutions to systems which involve flow and activated surfaces.

Department of Mathematics
Novo Nordisk A/S
Period: 01/08/2007 → 31/07/2010
Number of participants: 3
Project participant:
Olsen, Ole Hvilsted (Ekstern)
Project Manager, organisational:
Sørensen, Mads Peter (Intern)
Ingwersen, Steen Hvass (Ekstern)

Financing sources
Source: Forskningsprojekter - Erhvervsforskere, VTU
Name of research programme: Forskningsprojekter - Erhvervsforskere, VTU
Amount: 1,340,000.00 Danish Kroner
Project

Homotopy based 3D reconstruction of water columns from 2D cross section acoustic data

Department of Informatics and Mathematical Modeling
Period: 15/07/2007 → 29/09/2010
Number of participants: 5
PhD Student:
Sharma, Ojaswa (Intern)
Supervisor:
Christensen, Niels Jørgen (Intern)
Main Supervisor:
Antón Castro, Francesc/François (Intern)
Examiner:
Hansen, Vagn Lundsgaard (Intern)
Sellarès, Joan Antoni (Ekstern)

Financial sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Cognitive components for contextual search of music
Department of Informatics and Mathematical Modeling
Period: 01/07/2007 → 29/09/2010
Number of participants: 5
Phd Student:
Petersen, Michael Kai (Intern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Larsen, Jan (Ekstern)
Honkela, Timo (Ekstern)
Sikström, Sverker (Ekstern)

Financial sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Functional Materials with Embedded Nano and Micro Struktures
The Danish Research and Innovation Government Agency (Forsknings- og Innovationsstyrelsen) has granted the innovation consortium "Functional Materials with Embedded Nano and Micro Struktures" (FINST) about 6 Mkr for the development of measuring techniques for industrial components and surfaces, which are modified on the nano and micro meter scale. Advanced measuring techniques are a necessary requisite for controlling the functionality of products on this scale. The metrological challenge is to develop normals and to make procedures for traceability of nano and micro scale industrial products. Together with COM, DTU, Department of Mathematics, DTU, is involved in modeling of measuring techniques based on optical diffraction of laser light from nano structured surfaces. Numerical simulations will constitute an integral part of the functionality of the measuring instruments under development.

Danish Institute of Fundamental Metrology
Department of Micro- and Nanotechnology
Department of Mathematics
Department of Photonics Engineering
FORCE Technology
CemeCon Scandinavia A/S
Ignis Photonyx A/S
SCF Technologies A/S
University of Southern Denmark
Period: 01/07/2007 → 30/06/2010
Number of participants: 9
Nano technology, Mathematical modelling, Optics, Metrology
Acronym: FINST
Project participant:
Bundgaard, Ole (Ekstern)
Mikkelsen, Niels Jørgen (Ekstern)
Holst, Jesper (Ekstern)
Bilenberg, Brian (Ekstern)
Matematicum: The mathematical inspiratorium at DTU

This project is concerned with the theme of unfolding mathematical concepts and results for students and other mathematically curious visitors to Matematicum via hands-on experiments and stories. Each story and activity is ideally centered around a well-defined mathematical crux, which is then to be uncovered, unfolded, and applied to properly understand a given, otherwise non-obvious – or maybe even mysterious – phenomenon. For example: How can two circular rotations combine to give the linear motion of a pump? What are the rotors actually doing in the Enigma encryption machine? Why and how does a (good) boomerang return? How do we make a swarm of intercommunicating robots collaborate to solve a given task? How do the ants find or construct their shortest pathways? Which roofs pick up the most solar energy throughout the year? Concerning content and development of concept (as of December 2007): The Matematicum at the Department of Mathematics is a room which has now been arranged to receive up to 15 visitors at a time. A boomerang ‘story’ and a robot swarming ‘story’ have been implemented and tested. A 3D printer and 3D scanner have been installed. The printer is in full operation and supplies concrete models of geometric shape and function such as minimal surfaces and ingenious pumps. A fume cupboard is being installed for proper and safe post-processing of the 3D-printed objects. An original three-rotor German military Enigma machine has been purchased. We expect it to become the essential central ‘object’ for great ‘stories’ and activities in the Matematicum concerning the history and development of modern cryptology. Matematicum was officially opened at a reception at DTU Mathematics on March 6th 2008.

Geometry

Department of Mathematics
Period: 01/07/2007 → 01/12/2009
Number of participants: 5
Mathematical Inspiratorium
Project ID: 10109
Project participant:
Henriksen, Christian (Intern)
Schmidt, Karsten (Intern)
Knudsen, Lars Ramkilde (Intern)
Starke, Jens (Intern)
Project Manager, organisational:
Markvorsen, Steen (Intern)

Statistical modelling of tagging data from marine animals

Department of Informatics and Mathematical Modeling
Period: 01/07/2007 → 02/02/2011
Number of participants: 6
PhD Student:
Pedersen, Martin Wæver (Intern)
Supervisor:
Thygesen, Uffe Høgsbro (Intern)
Main Supervisor:
Madsen, Henrik (Intern)
Examiner:
Poulsen, Niels Kjølstad (Intern)
Huse, Geir (Ekstern)
Zucchini, Walter (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

3D Shape Modelling using High Level Descriptors
Department of Informatics and Mathematical Modeling
Period: 01/06/2007 → 22/06/2011
Number of participants: 6
PhD Student:
Dahl, Vedrana Andersen (Intern)
Supervisor:
Bærentzen, Jakob Andreas (Intern)
Main Supervisor:
Aanæs, Henrik (Intern)
Examiner:
Poulsen, Rasmus Reinhoeld (Intern)
Solem, Jan Erik (Ekstern)
Sporring, Jon (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Aspects for security policies
Department of Informatics and Mathematical Modeling
Period: 01/06/2007 → 08/12/2010
Number of participants: 6
PhD Student:
Yang, Fan (Intern)
Supervisor:
Nielsen, Hanne Riis (Intern)
Main Supervisor:
Nielsen, Flemming (Intern)
Examiner:
Probst, Christian W. (Intern)
De Nicola, Rocco (Ekstern)
Südholt, Mario (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD
A Systems Approach to Structure form Motion

Department of Informatics and Mathematical Modeling
Period: 01/06/2007 → 31/07/2009
Number of participants: 3
Phd Student:
Perfanov, Vesselin Kirilov (Intern)
Supervisor:
Aanæs, Henrik (Intern)
Main Supervisor:
Larsen, Rasmus (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Multi-material design optimization of composite structures

Department of Mathematics
Period: 01/06/2007 → 22/09/2010
Number of participants: 6
Phd Student:
Munoz Queupumil, Eduardo Javier (Intern)
Supervisor:
Lund, Erik (Ekstern)
Main Supervisor:
Stolpe, Mathias (Intern)
Examiner:
Heholdt, Tom (Intern)
Achtziger, Wolfgang (Intern)
Svanberg, Krister (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering
Project: PhD

Model-based predictive control of wind turbines

Department of Informatics and Mathematical Modeling
Period: 15/05/2007 → 02/03/2011
Number of participants: 6
Phd Student:
Henriksen, Lars Christian (Intern)
Supervisor:
Hansen, Morten Hartvig (Intern)
Main Supervisor:
Poulsen, Niels Kjølstad (Intern)
Examiner:
Jørgensen, John Bagterp (Intern)
Engelen, T. G. van (Ekstern)
Per, Brath (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut/centerfinansieret
Project: PhD

Design of metamaterials
Metamaterials have interesting properties for wavepropagation and this project will investigate the use of topology optimization techniques for designing such materials and devices made from such materials.
Department of Mathematics
Department of Mechanical Engineering

Michigan State University
Period: 01/05/2007 → 31/12/2007
Number of participants: 3
Acronym: EDS
Project participant:
Bendsøe, Martin P. (Intern)
Sigmund, Ole (Intern)
Diaz, Alejandro R. (Ekstern)

Financing sources
Source: Gaver, Private danske Fonde
Name of research programme: Gaver, Private danske Fonde
Amount: 80,000.00 Danish Kroner

Models and Analyses for Embedded Systems Design
Department of Informatics and Mathematical Modeling
Period: 01/04/2007 → 02/02/2011
Number of participants: 6
Phd Student:
Brekling, Aske Wiid (Intern)
Supervisor:
Madsen, Jan (Intern)
Main Supervisor:
Hansen, Michael Reichhardt (Intern)
Examiner:
Sparsø, Jens (Intern)
Ravn, Anders P. (Intern)
Vain, Jüri (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering
Project: PhD

New vision technology for multidimensional quality monitoring of food processes
The trained process operator plays a key role in today's food industry. His or her ability to judge processes such as continuous baking, roasting and frying processes by visual inspection is crucial. Automation has been slow due to inadequate technology. New forms of vision technology where the product is illuminated uniformly over a large area (50 cm2) and at specified wavelengths have the potential of matching much closer the visual judgement made by the trained process operator. The technology has proven its ability to difficult tasks in particle sorting and recent results indicate its large potential in food process control. The aim of the project is to investigate the potentials of this new vision technology and develop the technical/scientific basis for widespread use in process control of continuous baking, roasting and frying processes.

Division of Food Production Engineering
National Food Institute
Department of Systems Biology
Department of Informatics and Mathematical Modeling
Period: 15/03/2007 → 01/01/2012
Number of participants: 2
Project participant:
Adler-Nissen, Jens (Intern)
Project Manager, organisational:
Dissing, Bjørn Skovlund (Intern)
**Automatic Quantitative Image Analysis of 3D Micrographs**  
Department of Informatics and Mathematical Modeling  
Department of Energy Conversion and Storage  
Imaging and Structural Analysis  
Period: 01/03/2007 → 22/09/2010  
Number of participants: 7  
Phd Student: Jørgensen, Peter Stanley (Intern)  
Supervisor: Bowen, Jacob R. (Intern)  
Hansen, Karin Vels (Intern)  
Main Supervisor: Larsen, Rasmus (Intern)  
Examiner: Bærentzen, Jakob Andreas (Intern)  
Barnett, Scott (Intern)  
Østergaard, Lasse Riis (Ekstern)  

**Financing sources**  
Source: Internal funding (public)  
Name of research programme: Forskningsrådsfinansiering  
Project: PhD

**Design of computer experiments**  
Department of Informatics and Mathematical Modeling  
Period: 01/03/2007 → 08/12/2010  
Number of participants: 6  
Phd Student: Dehlendorff, Christian (Intern)  
Supervisor: Kulahci, Murat (Intern)  
Main Supervisor: Andersen, Klaus Kaae (Intern)  
Examiner: Nielsen, Bo Friis (Intern)  
Lophaven, Søren Nymand (Intern)  
Tyssedal, John (Ekstern)  

**Financing sources**  
Source: Internal funding (public)  
Name of research programme: DTU-lønnet stipendie  
Project: PhD

**An Investigation of Citizen ICT Safety and Security Awareness**  
Department of Informatics and Mathematical Modeling  
Aarhus University  
Danmarks IT-Center for Uddannelse og Forskning  
Period: 01/02/2007 → 30/06/2009  
Number of participants: 4  
Acronym: CIT-AWARE  
Project ID: 15545  
Project participant: Andersen, Preben (Ekstern)
Project Manager, organisational:
Sharp, Robin (Intern)
Gjedde, Lisa (Ekstern)
Meldgaard, Helle (Ekstern)

Financing sources
Source: Forskningsrådene - Andre
Name of research programme: Forskningsrådene - Andre
Amount: 1,999,999.00 Danish Kroner

PDE Control Mechanisms in Heterogeneous Media with Applications in Mathematical Bioscience
Department of Mathematics
Period: 01/02/2007 → 31/05/2009
Number of participants: 3
Phd Student:
Kaasen, Rune (Intern)
Supervisor:
Pedersen, Michael (Intern)
Main Supervisor:
Brøns, Morten (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Tools for model-based software descriptions
Department of Informatics and Mathematical Modeling
Period: 01/02/2007 → 31/08/2011
Number of participants: 6
Phd Student:
Larsen, Per (Intern)
Supervisor:
Madsen, Jan (Intern)
Main Supervisor:
Karlsson, Sven (Intern)
Examiner:
Probst, Christian W. (Intern)
Cohen, Albert (Ekstern)
Stenstrøm, Per (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Algebraisk Kodningsteori
Department of Mathematics
Period: 01/01/2007 → 21/04/2010
Number of participants: 6
Phd Student:
Brander, Kristian (Intern)
Supervisor:
Høholdt, Tom (Intern)
Main Supervisor:
Beelen, Peter (Intern)
Examiner:
Online measurement of visual quality parameters after heat treatment

Many foodstuffs have the shape of small pieces or particles that are heat treated in continuous open processes (corn flakes e.g.). Such processes are monitored by trained process operators who visually evaluate the product quality. There is a great need to support the evaluations of the process operators with vision technological systems that quickly are able to reveal deviations from the desired visual quality and adjust the process hereafter. In the project a new advanced form of vision technology will be investigated, the device can because of its special design be expected to detect small differences in color and wrongly colored small particles. This vision technology differs from NIR (near infrared reflection) by giving detailed picture information and not just sporadic measurements. The aim is to obtain a robust, flexible vision technological solution that later can be implemented in different industrial food productions.

Division of Food Production Engineering

National Food Institute

Department of Informatics and Mathematical Modeling

Videometer A/S

Nakskov Mill Foods A/S
Period: 01/01/2007 → 30/04/2011
Number of participants: 1
Project Manager, organisational:
Adler-Nissen, Jens (Intern)

Wavelets in theory and practice

Department of Mathematics

Wavelets in theory and practice
Period: 01/01/2007 → 12/07/2011
Number of participants: 2
Project Manager, organisational:
Christensen, Ole (Intern)
Forster, Brigitte (Ekstern)

Global Optimization for Topology Design of Metallic Microstrips

Department of Mathematics

Toyota Central Research & Development Laboratories, Inc.
Period: 01/12/2006 → 31/03/2007
Number of participants: 3
Contact person:
Nymann, Camilla (Intern)
Project participant:
Stolpe, Mathias (Intern)
Nomura, Tsuyoshi (Ekstern)
Decision Making and Uncertainty in Nonlinear Complex Systems: International Workshop in Helsingør, Denmark

The workshop intends to promote the development and application of new methods for decision making and strategic planning in particular with respect to Uncertainty and Nonlinear Effects in Complex Systems through the discussion of a limited number of invited scientists with different research background from various fields. The invited talks address these topics either directly or discuss methods with potential applications thereby. Program: M. Makowski (IIASA): Certain decision-making for uncertain problems T. Brenner (MPI Jena): A stochastic model of industry location - The case of the automobile industry in Germany R. E. Wilson (Bristol): Road Traffic Modelling: Nonlinear Dynamics, Data, and Future Multiscale Directions J. Casti (Santa Fe/IIASA): Would-be worlds: Toward a theory of complex systems K. Sneppen (NBI): Communication and topology in networks M. Eiswirth (FHI Berlin): Stoichiometric network analysis M. Labbe (Université Libre de Bruxelles): Reliable communication network design: models and solution methods F. Schweitzer (ETH Zürich): The role of local effects in collective decision processes C. Siettos (National Technical University of Athens): Coarse-grained computations for agent-based market models: An equation-free approach to nonlinear analysis and control of complex systems G. Silverberg (UNU-MERIT/ University of Maastricht): What a Difference a Dimension Makes: Collective Search and "Rationality" in Complex Technology Spaces

Department of Mathematics
Toyota CRDL
Number of participants: 4
Project ID: 10097
Project Manager, organisational:
Starke, Jens (Intern)
Bendsøe, Martin P. (Intern)
Yamazaki, S. (Ekstern)
Kikuchi, N. (Ekstern)

Financing sources
Source: Forsk. Andre offentlige og private - Udenlandske
Name of research programme: Forsk. Andre offentlige og private - Udenlandske
Amount: 400,000.00 Danish Kroner

Network-on-chip: Applikationer og topologiopitimering

Department of Informatics and Mathematical Modeling
Period: 01/10/2006 → 30/06/2010
Number of participants: 6
Phd Student:
Stuart, Matthias Bo (Intern)
Supervisor:
Nannarelli, Alberto (Intern)
Main Supervisor:
Sparse, Jens (Intern)
Examiner:
Pop, Paul (Intern)
Jantsch, Axel (Ekstern)
Pimentel, Andrew David (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Nonlinear Stochastic Modelling of Antimicrobial resistance in Bacterial Populations
Department of Informatics and Mathematical Modeling
Period: 01/10/2006 → 30/06/2010
Number of participants: 6
Phd Student:
Philipsen, Kirsten Riber (Intern)
Supervisor:
Christiansen, Lasse Engbo (Intern)
Main Supervisor:
Madsen, Henrik (Intern)
Examiner:
Molin, Søren (Intern)
Diekmann, Odo (Ekstern)
Ersbøll, Annette Kjær (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering
Project: PhD

PLATO-N : A PLAtform for Topology Optimisation incorporating Novel, Large-Scale, Free Material Optimisation and Mixed Integer Programming Methods
PLATO-N aims to overcome the limitations of current state-of-the-art topology optimisation tools in order to enable integration of optimisation assistance into the conceptual design process of the European aerospace industry. The following operational parameters, performance criteria and novel features are targeted: a) a reduction of turn-around time for practical solutions b) an increase of manageable problem size c) an increase in the number of manageable load cases d) consideration of composite materials, and post-processing tailored to exploit composite material features e) extension to multidisciplinary design criteria (stress, displacements, etc.) The strategic decisions that have been taken in terms of research goals are that: [1] The platform should be flexible with respect to the inclusion of new optimization algorithms and visualization tools, and it should provide a range of tools and modelling approaches geared to aeronautical needs. [2] The large-scale optimization algorithms should employ some form of algorithm based on a development of dedicated first-order methods. [3] The method should be extended to plate and shell problems and should be able to handle multiple objectives such as stiffness, vibration, and buckling problems. [4] An algorithm should be developed in order to handle local constraints. [5] Benchmark examples should be generated using mixed-integer convex models. [6] The results should be interpreted and visualized in a manner consistent with aerospace needs, e.g., shell structures using laminate lay-ups. [7] The platform should be tested on examples of industrial origin.

Department of Mathematics
Technion-Israel Institute of Technology
Universität Bayreuth
Friedrich-Alexander University Erlangen-Nuremberg
Academy of Sciences of the Czech Republic
Nymann, Camilla (Intern)
Stainko, Roman (Intern)
Bendsæ, Martin P. (Intern)
Stolpe, Mathias (Intern)

Financing sources
Source: Forsk. EU - Andre EU-midler
Name of research programme: Forsk. EU - Andre EU-midler
Amount: 3,600,000.00 Danish Kroner

Rasmussen, Morten Sleth (Intern)
Karlsson, Sven (Intern)
Madsen, Jan (Intern)
Sparsø, Jens (Intern)
Probst, Christian W. (Intern)
Grahn, Håkan (Ekstern)
Nurmi, Jari Antero (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie

Relations
Publications:
Support for Programming Models in Network-on-Chip-based Many-core Systems
Project: PhD

Andersen, Peter Bjørn (Intern)
Bak, Christian (Intern)
Buhl, Thomas (Intern)
Gaunaa, Mac (Intern)

Wind Turbine with Trailing Edge Flaps for Load Alleviation
Department of Informatics and Mathematical Modeling
Period: 01/10/2006 → 30/06/2010
Number of participants: 8
Phd Student:
Andersen, Peter Bjørn (Intern)
Supervisor:
Bak, Christian (Intern)
Buhl, Thomas (Intern)
Gaunaa, Mac (Intern)
Analysis and Optimization of Dynamical Processes on Networks

Dynamical processes on networks are relevant in many application areas like transportation networks, communication networks, economic networks and production networks in flexible manufacturing systems. It is a common aim in all these cases to better understand and finally optimize the corresponding dynamical processes and networks. In this regard, one major interest is the investigation of macroscopic pattern formation on the network structures. Examples for such patterns are technological propagation (traveling front) in economic networks or waves of traffic jams (traveling pulses) in transportation networks.

Department of Mathematics

Toyota CRDL
Period: 01/09/2006 → 31/08/2009
Number of participants: 2
Project ID: 10088
Project participant:
Berkemer, Rainer (Intern)
Project Manager, organisational:
Starke, Jens (Intern)

Financing sources
Source: Forsk. Andre offentlige og private - Udenlandske
Name of research programme: Forsk. Andre offentlige og private - Udenlandske
Amount: 2,162,400.00 Danish Kroner

Applied topological fluid mechanics: Bioreactors and bluff body wakes

Department of Mathematics

Monash University
Period: 01/09/2006 → 06/03/2007
Number of participants: 2
Contact person:
Hourigan, Kerry (Ekstern)
Project Manager, organisational:
Brøns, Morten (Intern)

Financing sources
Source: Forskningsrådene - STVF
Name of research programme: Forskningsrådene - STVF
Amount: 138,768.00 Danish Kroner

Approximate inference for wireless Communications

Department of Informatics and Mathematical Modeling
Period: 01/09/2006 → 31/03/2010
Number of participants: 6
Phd Student:
Hansen, Morten (Intern)
Supervisor:
Classification of Meromorphic Vector Fields
A complex polynomial defines a holomorphic vector field in the complex plane. The quasi-conformal conjugacy class of the polynomial is completely determined by a combinatorial invariant. Furthermore, within each combinatorial class the polynomial is uniquely determined by a finite number (settled by the combinatorial class) of complex numbers. This fundamental classification of complex polynomial vector fields is proved using surgery. Further developments are to classify possible bifurcations, to understand the decomposition of parameter spaces due to the different combinatorial classes and the bifurcations among them, and also to extend to meromorphic vector fields arising from rational functions on the Riemann sphere.

Department of Mathematics
Period: 01/09/2006 → 31/08/2009
Number of participants: 3
Holomorphic Dynamical Systems
Project participant:
Dias, Kealey (Intern)
Henriksen, Christian (Intern)
Project Manager, organisational:
Branner, Bodil (Intern)

Financing sources
Source: Ph.d Central finansieret
Name of research programme: Ph.d Central finansieret
Amount: 115,000.00 Danish Kroner
Project

Cognitive Components in Sound Streams
Department of Informatics and Mathematical Modeling
Period: 01/09/2006 → 21/04/2010
Number of participants: 7
Phd Student:
Petersen, Anders (Intern)
Supervisor:
Hansen, Lars Kai (Intern)
Kyllingsbæk, Søren (Intern)
Main Supervisor:
Andersen, Tobias (Intern)
Examiner:
Larsen, Jan (Ekstern)
Bundesen, Claus (Ekstern)
Logan, Gordon D. (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Eksternt finansieret virksomhed
Project: PhD
DCAMM Research School: International Researcher Education Activities

The DCAMM International Graduate Research School is part of the activities of DCAMM, the Danish Center for Applied Mathematics and Mechanics. DCAMM is a framework for internationally oriented scientific collaboration between staff members at a number of departments at the Technical University of Denmark and Aalborg University. The Ph.D.-students of the School are members of DCAMM through the departments constituting DCAMM and they are enrolled in the relevant Ph.D. programmes at DTU and AAU. The School's role is to provide for an interdisciplinary framework for education of young researchers in an international research environment. An important activity of DCAMM and the Research School are the DCAMM SYMPOSIA. These are bi-annual 3 day workshops with presentations mostly by Ph.D. students and post.-docs. The School also maintains a programme of PH.D.-COURSES / ADVANCED SCHOOLS. These courses (2.5 to 5 ETCS) are typically held as short intensive courses of 5 to 9 working days, enabling participation by students from all DCAMM institutions, foreign students as well as participants from industry. The governing body of the School is the Scientific Council of DCAMM.

Department of Mathematics
Period: 01/09/2006 → 31/08/2011
Number of participants: 2
Project ID: 95-429-10091
Contact person:
Nymann, Camilla (Intern)
Project Manager, organisational:
Bendsøe, Martin P. (Intern)

Financing sources
Source: Forskningsrådene - Andre
Name of research programme: Forskningsrådene - Andre
Amount: 5,600,000.00 Danish Kroner

European Network of Funding Agencies - Coordination of National Complexity Research and Training Activities: EU contract no 036195

Complexity and complex systems is an emergent and rapidly growing research field with a large technological potential, in which Europe has fostered scientific excellence with extensive collaboration across Europe and abroad. Based on the need to put stronger focus on this field and to further its high growth potential, 11 European Research Councils and Ministries initiated a consortium, in the form of a specific support action, aiming to establish the necessary environment for coordinating nationally strategically planned research activities.

Risø National Laboratory
Risø National Laboratory for Sustainable Energy

Department of Mathematics

Department of Physics
Period: 01/09/2006 → 31/08/2009
Number of participants: 6
Acronym: Complexity-NET
Project participant:
Sørensen, Mads Peter (Intern)
Mosekilde, Erik (Intern)
Jensen, Mogens Høgh (Ekstern)
Sørensen, Preben Graae (Ekstern)
Sibani, Paolo (Ekstern)
Project Manager, organisational:
Alstrøm, Preben (Ekstern)

Financing sources
Source: Forsk. EU - Andre EU-midler
Name of research programme: Forsk. EU - Andre EU-midler
Amount: 1,900,000.00 Danish Kroner

Meromorphic Vector Fields and Circle Packings

Department of Mathematics
Period: 01/09/2006 → 10/02/2010
Number of participants: 6

Phd Student:
Dias, Kealey (Intern)

Supervisor:
Branner, Bodil (Intern)

Main Supervisor:
Henriksen, Christian (Intern)

Examiner:
Markvorsen, Steen (Intern)
Epstein, Adam Lawrence (Ekstern)
Petersen, Carsten Lunde (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnnet stipendie
Project: PhD

**European Student Workshop on Mathematical Modelling in Industry and Commerce : ECMI Modelling Week**
The purpose of the student workshop is to train students in using mathematical modelling in development of technical systems and in economics. Project work was performed in groups of 5-6 students on industrial mathematics problems posed by supervisors from ECMI centers. Each group consists of an international mix of European and non-European students. The projects were concluded by oral presentations and written reports. The project was supported by the ERASMUS Intensive Programme under the EU SOCRATES Programme. Grant agreement number: 29158-IC-1-2004-1-DK-ERASMUS-IPUC-1.

Department of Mathematics
Number of participants: 0
Project ID: 10076

Financing sources
Source: Uddannelse. EU. Andre EU-midler
Name of research programme: Uddannelse. EU. Andre EU-midler
Amount: 364,000.00 Danish Kroner
Project

**Call Center Capacity Planning**
Department of Informatics and Mathematical Modeling
Period: 01/08/2006 → 31/03/2010
Number of participants: 6

Phd Student:
Nielsen, Thomas Bang (Intern)

Supervisor:
Iversen, Villy Bæk (Intern)

Main Supervisor:
Nielsen, Bo Friis (Intern)

Examiner:
Stolletz, Raik (Intern)
Borst, S.C. (Ekstern)
Nyberg, Christian (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnnet stipendie
Project: PhD

**Identification of Ecological Thresholds of Sustainability in Marine Ecosystems**
Department of Informatics and Mathematical Modeling
Period: 01/08/2006 → 25/05/2011
Number of participants: 6
Phd Student: Møller, Jan Kloppenborg (Intern)
Supervisor: Carstensen, Niels Jacob (Intern)
Main Supervisor: Madsen, Henrik (Intern)
Examiner: Nielsen, Bo Friis (Intern)
Ditlevsen, Susanne (Ekstern)
Guttorp, Peter (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: 1/3 DTU-stip, 2/3 FUR/andet
Project: PhD

Intelligent Analysis and Compression of Multi-sensor Data
Department of Informatics and Mathematical Modeling
Period: 01/08/2006 → 01/06/2009
Number of participants: 3
Phd Student: Francke, Mathias (Intern)
Supervisor: Hallundbæk, Jørgen (Ekstern)
Main Supervisor: Larsen, Jan (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: ErhvervsPhD-ordningen VTU
Project: PhD

NordSecMob Master's Programme in Security and Mobile Computing
Department of Applied Mathematics and Computer Science
Embedded Systems Engineering
Aalto University
KTH - Royal Institute of Technology
Norwegian University of Science and Technology
University of Tartu
Period: 01/08/2006 → 31/07/2012
Number of participants: 1
Acronym: NordSecMob
Project participant: Stassen, Flemming (Intern)

Financing sources
Source: Public research council
Name of research programme: Nordplus
Amount: 151,000.00 Euro
Source: EU research programme (public)
Name of research programme: Erasmus Mundus
Amount: 4,844,000.00 Euro
Source: Unknown
Name of research programme: Tuition fees
Amount: 520,000.00 Euro
Project
Second International Symposium on Bifurcations and Instabilities in Fluid Dynamics

Hydrodynamic stability is of fundamental importance in fluid dynamics and is a well-established subject of scientific investigation that continues to attract great interest of the fluid mechanics community. Hydrodynamic instabilities of prototypical character are, for example, the Rayleigh-Bénard, the Taylor-Couette, the Bénard-Marangoni, the Rayleigh-Taylor, and the Kelvin-Helmholtz instabilities. A fundamental understanding of various patterns of bifurcations such as identifying the most dominant mechanisms responsible for the instability threshold is also required if one is to design reliable and efficient industrial processes and applications, such as melting, mixing, crystal growth, coating, welding, flow re-attachment over wings, and others. The symposium aimed at bringing together scholars with mutual interest in computational, experimental, and theoretical methods for the analysis of bifurcation and instability phenomena in fluid dynamics. The conference took place 15-18 August 2006 with 40 participants. Proceedings will appear as a volume in Journal of Physics: Conference Series

Department of Mathematics

Department of Mechanical Engineering

Period: 01/08/2006 → 31/03/2007
Number of participants: 2
Acronym: BIFD2006
Project participant:
Sørensen, Jens Nørkær (Intern)
Project Manager, organisational:
Brøns, Morten (Intern)

Financing sources
Source: Forskningsrådene - STVF
Name of research programme: Forskningsrådene - STVF
Amount: 75,000.00 Danish Kroner
Project

Advanced Methods for Biological Shape Analysis

Department of Informatics and Mathematical Modeling

Number of participants: 6
Phd Student:
Hansen, Michael Sass (Intern)
Supervisor:
Ersbøll, Bjarne Kjær (Intern)
Main Supervisor:
Larsen, Rasmus (Intern)
Examiner:
Paulsen, Rasmus Reinhold (Intern)
Rueckert, Daniel (Ekstern)
Van Leemput, Koen (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Improved Statistical Analysis of Sleep EEG Data in Relation to Pharmacokinetics

Department of Informatics and Mathematical Modeling

Period: 01/07/2006 → 10/02/2010
Number of participants: 6
Phd Student:
Mortensen, Stig Bousgaard (Intern)
Supervisor:
Hougaard, Philip (Ekstern)
Main Supervisor:
Madsen, Henrik (Intern)
Predictive Tools for Designing new Insulins and Treatment Regimes

Department of Informatics and Mathematical Modeling
Period: 01/07/2006 → 16/12/2009
Number of participants: 7
Phd Student: Klim, Søren (Intern)
Supervisor: Ingwersen, Steen Hvass (Ekstern)
Kristensen, Niels Rode (Intern)
Main Supervisor: Madsen, Henrik (Intern)
Examiner: Jørgensen, John Bagterp (Intern)
Gabrielsson, Johan (Ekstern)
Lavielle, Marc (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: ErhvervsPhD-ordningen VTU
Project: PhD

Tool Optimization for Welding Processes

Department of Mathematics
Period: 15/06/2006 → 10/02/2010
Number of participants: 7
Phd Student: Larsen, Anders Astrup (Intern)
Supervisor: Hattel, Jesper Henri (Intern)
Sigmund, Ole (Intern)
Main Supervisor: Stolpe, Mathias (Intern)
Examiner: Lindgren, Lars-Erik (Ekstern)
Duysinx, Pierre (Intern)
Lund, Erik (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU, Samfinansiering
Project: PhD

2+1 dimensional Topological Quantum Field Theories a la Yoshida

This project concerns the study of knots, links, and other low-dimensional objects. It is a mathematical project, but one of its central components is to develop techniques and mathematical quantities which are applicable to problems in modern biochemistry such as the investigation of mechanisms behind viruses (more of this below). The project involves the study of a certain family of link invariants called quantum invariants. The focus will be on obtaining a deeper knowledge about these invariants’ ability to separate knots according to their topological type. To obtain such knowledge, research points in the direction that it is crucial to have a geometric understanding of quantum invariants. Today we are far from having such
understanding. It is of crucial importance to know a given invariant’s ability to distinguish knot types if one wants to apply this invariant in an efficient way to biochemistry. There are different approaches to the quantum invariants. In this project we will focus on a new approach due to Tomoyoshi Yoshida, the Department of Mathematics at the Tokyo Institute of Technology, Japan. We believe for various technical reasons that his approach is particularly well suited to obtain a deeper geometric understanding of the quantum invariants. The complement of a given knot is the surrounding 3-dimensional space of the knot, i.e. the space left after removing a ‘small’ tubelike neighborhood of the knot. It turns out that we can study knots by studying their complements. Thus the study of knots can be seen as a part of the study of 3-dimensional spaces. So far Yoshida has constructed invariants of so-called closed 3-manifolds. Extensions of his theory are necessary to allow for boundaries which is necessary if we want to use his approach to study knots and 3-manifolds efficiently. Thus our first goal is to extend Yoshida’s theory to a so-called 2+1 dimensional topological quantum field theory. Another goal is to calculate and geometrically interpret a certain asymptotic expansion of the invariants (the so-called large quantum level asymptotics). Certain calculations point in the direction that these asymptotics contain a wealth of geometric information about the quantum invariants. These results have led to a list of conjectures about these asymptotics. In the best case a full understanding of the large level asymptotics could give us a complete description of the quantum invariants ability to separate different knot types. Let us end by returning to viruses. Viruses attack cells in order to alter the DNA inside them. To do this, they bring closer certain parts of the DNA, then cut them and stick them back together differently in such a way that the molecule of DNA is transformed into a knot. One of the essential aspects of the struggle against viruses is to recognize the signature of different viruses by their effects on the DNA. One can characterize these effects by the topological (isotopy) type of knot which results from the action of the virus. But then it is necessary to be able to recognize the knot in question if one wants to find out which virus it is. The job is then to implement applications of suitable quantum invariants as knot detectors, but then it is crucial to know how good these invariants are as knot detectors. The project has received partial funding from the National Science Foundation (NSF) in USA, DMS-0604994.

Department of Mathematics  
Period: 01/06/2006 → 31/05/2009  
Number of participants: 3  
Project participant:  
Hansen, Søren Kold (Intern)  
Moskovich, Daniel (Intern)  
Yoshida, Tomoyoshi (Ekstern)  
Financing sources  
Source: Forsk. Andre offentlige og private - Udenlandske  
Name of research programme: Forsk. Andre offentlige og private - Udenlandske  
Amount: 100,000.00 Danish Kroner  
Project  

57th European Study Group with Industry  
A Study Group is a forum where academic mathematicians work on problems directly related to industry. Workshops of this nature have taken place in Great Britain for a number of years, going back to 1963 when Prof. Alan Tayler started the Oxford Study Group with Industry. The coordination of Study Groups is now in the hands of European Consortium for Mathematics in Industry (ECMI), and the name is currently European Study Group with Industry (ESGI). At a meeting in 1997 of the ECMI Council it was decided that Study Groups should also be held outside Great Britain, and the first one of those was ESGI32 in Lyngby, Denmark. The format of a Study Group is a week long meeting (Monday - Friday) where a number of companies on the first day of the meeting each present a research problem they believe to be of a mathematical nature. Each such problem is taken up by a group of mathematicians who, together with the company representative, work towards the solution of the problem, through Thursday afternoon. Friday is used to present in a plenary session the results from each of the problem groups. The reasons for the continuing success of the Study Groups are simple: The industrial participants get, for a very modest sum, a highly qualified ‘think tank’ of mathematicians to focus on their particular research problem. Besides a full or partial resolution of the problem, the companies establish useful contacts with international researchers. The academics benefit from new ideas and challenges from the real world, providing inspiration for both education and their own research. The success criterion for a Study Group is that participating companies experience the meeting as useful and that it brings them a significant step closer to the resolution of their problem. For the Danish study groups we also have the goal that it will establish closer ties between Danish Industry and Danish mathematicians.

Department of Mathematics  
University of Southern Denmark  
Period: 01/05/2006 → 31/12/2006  
Number of participants: 4  
Acronym: ESGI57  
Project ID: 10083  
Project participant:  
Gravesen, Jens (Intern)
Discrete Gabor systems and their applications
Department of Mathematics
Period: 01/05/2006 → 01/05/2008
Number of participants: 2
Project participant:
Christensen, Ole (Intern)
Kim, Rae Young (Ekstern)

Physical Models and Robust Estimation in Sensor Network Security
Department of Informatics and Mathematical Modeling
Period: 01/05/2006 → 31/08/2006
Number of participants: 2
Phd Student:
Rasmussen, Kasper Bonne (Intern)
Main Supervisor:
Madsen, Jan (Intern)

Shift-invariant systems and their duals
Department of Mathematics
Period: 01/05/2006 → 01/05/2007
Number of participants: 2
Project participant:
Christensen, Ole (Intern)
Sun, Wenchang (Ekstern)

Evolution and adaptation of antimicrobial resistance in bacterial populations
It is generally believed that evolution of resistance occurs as a series of random single point mutations. However, we believe that emergence of new characters occurs as multiple mutations probably in sub-populations as a consequence of fluctuating stresses caused by lethal substances, such as antibiotics, and that these populations are so limited in size that the selection process is greatly affected by chance (stochastic). We will combine expertise in bacteriology, molecular biology, microbial epidemiology, mathematical modelling and phylogeny to study the evolution and adaptation of antimicrobial resistance in bacterial populations. Focus will be on resistance in staphylococci and Pseudomonas because of the major clinical problems with resistance in these bacteria. The results are expected to be useful in predicting
appearance of new antimicrobial resistance problems, guide intervention strategies for the future, lead to new treatment strategies and possible also lead to industrial development of new biotechnologies based on evolutionary concepts.

Division of Microbiology and Risk Assessment
National Food Institute
Department of Informatics and Mathematical Modeling
University of Copenhagen
Period: 30/04/2006 → 31/03/2010
Number of participants: 11
Project participant:
Ingmer, Hanne (Ekstern)
Christensen, Henrik (Ekstern)
Ciofu, Oanu (Ekstern)
Andersen, Marianne T. (Ekstern)
Mandsberg, Lotte (Ekstern)
Jensen, Lars Bøge (Intern)
Hasman, Henrik (Intern)
Agersø, Yvonne (Intern)
Madsen, Henrik (Ekstern)
Christiansen, Lasse Engbo (Intern)
Project Manager, organisational:
Aarestrup, Frank Møller (Intern)

Data-analyse i sparse, høj-dimensionale rum
Department of Informatics and Mathematical Modeling
Period: 01/04/2006 → 31/03/2010
Number of participants: 5
Phd Student:
Clemmensen, Line Katrine Harder (Intern)
Main Supervisor:
Ersbøll, Bjarne Kjær (Intern)
Examiner:
Larsen, Rasmus Werner (Intern)
Bigun, Josef (Ekstern)
Bro, Rasmus (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Methods for Investigation of QT Prolongations
Department of Informatics and Mathematical Modeling
Period: 01/04/2006 → 31/05/2010
Number of participants: 2
Phd Student:
Jónsdóttir, Anna Helga (Intern)
Main Supervisor:
Madsen, Henrik (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD
Search in Spoken Documents

Department of Informatics and Mathematical Modeling
Period: 01/04/2006 → 16/12/2009
Number of participants: 6
Phd Student:
Mølgaard, Lasse Lohilahti (Intern)
Supervisor:
Hansen, Lars Kai (Intern)
Main Supervisor:
Larsen, Jan (Intern)
Examiner:
Winther, Ole (Intern)
Andreasen, Troels (Ekstern)
Girolami, Mark (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering
Project: PhD

Molecular Brain Imaging - New Data-analytic Strategies

Department of Informatics and Mathematical Modeling
Period: 15/03/2006 → 31/10/2007
Number of participants: 2
Phd Student:
Böðvarsson, Bjarni (Intern)
Supervisor:
Hansen, Lars Kai (Intern)
Main Supervisor:

Financing sources
Source: Internal funding (public)
Name of research programme: Eksternt finansieret virksomhed
Project: PhD

Data Assimilation in Marine Modelling

Department of Informatics and Mathematical Modeling
Period: 01/03/2006 → 25/11/2009
Number of participants: 6
Phd Student:
Frydendall, Jan (Intern)
Supervisor:
Serensen, Jacob Viborg Tornfeldt (Intern)
Main Supervisor:
Madsen, Henrik (Intern)
Examiner:
Poulsen, Niels Kjølstad (Intern)
Carstensen, Niels Jacob (Intern)
Heemink, Arnold Willem (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: 1/3 DTU-stip, 2/3 FUR/andet
Project: PhD

Programming Models and Tools for Intelligent Embedded Systems

Department of Informatics and Mathematical Modeling
**Period:** 01/03/2006 → 29/09/2010  
**Number of participants:** 5  
**Phd Student:** Sørensen, Peter Verner Bojsen (Intern)  
**Main Supervisor:** Madsen, Jan (Intern)  
**Examiner:** Jensen, Christian D. (Intern)  
Jerraya, Ahmed Amine (Ekstern)  
Svensson, Bertil (Ekstern)  

**Financing sources**  
Source: Internal funding (public)  
Name of research programme: DTU-lønnet stipendie  
Project: PhD

### Automatisk kalibrering og attenuation korrektion i netværk af små vejrradar

Department of Informatics and Mathematical Modeling  
**Period:** 01/02/2006 → 26/08/2009  
**Number of participants:** 6  
**Phd Student:** Pedersen, Lisbeth (Intern)  
**Supervisor:** Jensen, Niels Einar (Ekstern)  
**Main Supervisor:** Madsen, Henrik (Intern)  
**Examiner:** Mikkelsen, Peter Steen (Intern)  
Overgaard, Søren (Ekstern)  
Sempere-Torres, Daniel (Ekstern)  

**Financing sources**  
Source: Internal funding (public)  
Name of research programme: ErhvervsPhD-ordningen VTU  
Project: PhD

### Lighting Design and Real-time Global Illumination

Department of Informatics and Mathematical Modeling  
**Period:** 01/02/2006 → 30/03/2011  
**Number of participants:** 5  
**Phd Student:** Kristensen, Anders Wang (Intern)  
**Main Supervisor:** Christensen, Niels Jørgen (Intern)  
**Examiner:** Bærentzen, Jakob Andreas (Intern)  
Henriksen, Knud (Ekstern)  
Myszkowski, Karol (Ekstern)  

**Financing sources**  
Source: Internal funding (public)  
Name of research programme: DTU-lønnet stipendie  
Project: PhD

### Graphs on higher surfaces

This project is a collaboration between Dr. Ken-ichi Kawarabayashi, National Institute of Informatics, National Center of Science, Japan, and Professor Carsten Thomassen, DTU, concerning extendability of results on planar graphs to higher surfaces. The project is supported (in the form of travel expenses) by FNU (Rammebevilling i Diskret Matematik) and National Center of Science, Tokyo, Japan.
History of Mathematics
Planning and editing a volume on "History of Mathematics" for the monumental "Encyclopedia of Life Support Systems" (EOLSS), which is published under the auspices of UNESCO. Also author of a few of the articles. EOLSS attempts to forge pathways between disciplines in order to show their interdependence and helps foster the transdisciplinary aspects of the relationship between nature and human society. It deals in detail with interdisciplinary subjects, but it is also disciplinary as each major core subject is covered in great depth, by world experts.

Innovative Joining Processes Applying Integrated Modelling
Advanced industrial product development is faced with steadily growing demands for joining new materials, often in dissimilar combinations, implying complicated joining problems. It is therefore imperative that manufacturing of joints in high tech products should be treated with scientific engineering methods. This is, however, seldom done to an extent justified by its importance. Although traditional arc welding processes have been subjected to numerical analysis of isolated problems such as temperature analysis, weld pool dynamics, microstructural evolution as well as transient and residual stress/strain and distortion analysis the idea of modeling with the aim of optimizing the entire process is still in its infancy state, and when it comes to more sophisticated processes like resistance welding (RW) and friction stir welding (FSW) even more basic numerical studies are in an early stage of development. Both of these processes need complex thermo-mechanical calculations, microstructural predictions as well as thorough analysis of large plastic deformations in order to predict weld strength and optimum welding parameters as well as final geometry. These problems are challenging and of multi-physics nature involving complex mechanisms comprising several cross-disciplinary areas such as materials science, thermodynamics, solid and fluid mechanics as well as process technology and applied numerical analysis. The
objective of the present project is to develop advanced numerical models applicable for simulation of RW and FSW aiming at possible optimization of the entire processes. Focus will be set on overall numerical modelling strategies specific for each of the two welding processes as well as more detailed investigations of microstructures, mechanical properties, strength and weld quality.

Department of Management Engineering

Department of Mathematics

Department of Mechanical Engineering

Period: 01/01/2006 → 31/12/2009
Number of participants: 5
Acronym: INNOJoint
Project ID: 80700
Project participant:
Bay, Niels Oluf (Intern)
Somers, Marcel A. J. (Intern)
Hattel, Jesper Henri (Intern)
Bendsøe, Martin P. (Intern)
Tvergaard, Viggo (Intern)

Financing sources
Source: Forskningsrådene - STVF
Name of research programme: Forskningsrådene - STVF
Amount: 20,000,000.00 Danish Kroner

MECOBS- Modelling, Estimation and Control of Biotechnological Systems

Department of Mathematics

Period: 01/01/2006 → 31/12/2008
Number of participants: 1
Project Manager, organisational:
Pedersen, Michael (Ekstern)

Financing sources
Source: Forskningsrådene - STVF
Name of research programme: Forskningsrådene - STVF
Amount: 900,000.00 Danish Kroner

Multimodal Neuroaktivitetsanalyse

Department of Informatics and Mathematical Modeling

Period: 01/01/2006 → 21/12/2010
Number of participants: 6
Phd Student:
Skimminge, Arnold Jesper Møller (Intern)
Supervisor:
Baaré, William F. C. (Ekstern)
Main Supervisor:
Larsen, Rasmus (Intern)
Examiner:
Ersbøll, Bjarne Kjær (Intern)
Ashburner, John (Ekstern)
Østergaard, Lasse Riis (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: 1/3 DTU-stip, 2/3 FUR/andet
Project: PhD

Advanced industrial product development is faced with steadily growing demands for joining new materials, often in dissimilar combinations, implying complicated joining problems. It is therefore imperative that manufacturing of joints in high tech products should be treated with scientific engineering methods. This is, however, seldom done to an extent justified by its importance. Although traditional arc welding processes have been subjected to numerical analysis of isolated problems such as temperature analysis, weld pool dynamics, microstructural evolution as well as transient and residual stress/strain and distortion analysis the idea of modeling with the aim of optimizing the entire process is still in its infancy state, and when it comes to more sophisticated processes like resistance welding (RW) and friction stir welding (FSW) even more basic numerical studies are in an early stage of development. Both of these processes need complex thermo-mechanical calculations, microstructural predictions as well as thorough analysis of large plastic deformations in order to predict weld strength and optimum welding parameters as well as final geometry. These problems are challenging and of multi-physics nature involving complex mechanisms comprising several cross-disciplinary areas such as materials science, thermodynamics, solid and fluid mechanics as well as process technology and applied numerical analysis. The objective of the present project is to develop advanced numerical models applicable for simulation of RW and FSW aiming at possible optimization of the entire processes. Focus will be set on overall numerical modelling strategies specific for each of the two welding processes as well as more detailed investigations of microstructures, mechanical properties, strength and weld quality. The part of the project carried out at MAT is concerned with optimization of the welding processes using rational computational tools from optimal design and sensitivity analysis.

Department of Mathematics
Period: 01/01/2006 → 31/12/2009
Number of participants: 3
Acronym: INNOJOINT
Project ID: 95-429-10078
Project participant:
Bendsøe, Martin P. (Intern)
Bogomolny, Michael (Intern)
Larsen, Anders Astrup (Intern)

Financing sources
Source: Forskningsrådene - STVF
Name of research programme: Forskningsrådene - STVF
Amount: 1,871,000.00 Danish Kroner
Project

The Virtual Slaughterhouse - Constructing a virtual Knife

Department of Informatics and Mathematical Modeling
Period: 01/01/2006 → 01/07/2009
Number of participants: 6
Phd Student:
Hansen, Mads Fogtmann (Intern)
Supervisor:
Christensen, Lars Bager (Intern)
Main Supervisor:
Larsen, Rasmus (Intern)
Examiner:
Nielsen, Allan Aasbjerg (Intern)
Bajcsy, Ruzena (Ekstern)
Modersitzki, Jan (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: 1/3 DTU-stip, 2/3 FUR/andet
Project: PhD

Topology Optimization Problems with Design-Dependent Sets of Constraints

Department of Optimization Mathematics
Period: 01/01/2006 → 30/06/2010
Number of participants: 7
Phd Student:
Cryptographic Hash Functions
The aim of this project is to research cryptographic hash functions and their security, especially when such are used in digital signature protocols. Research will consist of both cryptanalysis and design of hash functions.

Department of Mathematics
Period: 01/12/2005 → 30/11/2008
Number of participants: 2
Project participant:
Thomsen, Søren Steffen (Intern)
Project Manager, organisational:
Knudsen, Lars Ramkilde (Intern)

Financing sources
Source: Forskningsrådene - STVF
Name of research programme: Forskningsrådene - STVF
Amount: 1,500,000.00 Danish Kroner
Project
Aanæs, Henrik (Intern)
Tarp-Johansen, Mads Jeppe (Ekstern)

Main Supervisor:
Ersbøll, Bjarne Kjær (Intern)
Examiner:
Hansen, Lars Kai (Intern)
Demirci, M. Fatih (Ekstern)
Sauter, Udo Hans (Ekstern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: ErhvervsPhD-ordningen VTU
Project: PhD

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**Asynkrone Network-on-Chip**
Department of Informatics and Mathematical Modeling
Period: 01/10/2005 → 31/07/2009
Number of participants: 2
Phd Student:
Stensgaard, Mikkel Bystrup (Intern)
Main Supervisor:
Sparsø, Jens (Intern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

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**Learning Based Compensation of Nonlinearities in Microspeakers**
Department of Informatics and Mathematical Modeling
Period: 01/10/2005 → 15/04/2007
Number of participants: 5
Phd Student:
Larsen, Allan Renneberg (Ekstern)
Supervisor:
Agerkvist, Finn T. (Intern)
Munk, Steen M. (Intern)
Rasmussen, Karsten Bo (Intern)
Main Supervisor:
Larsen, Jan (Intern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

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**Proceskapabilitet fra et industrielt perspektiv**
Department of Informatics and Mathematical Modeling
Period: 01/10/2005 → 30/09/2010
Number of participants: 6
Phd Student:
Windfeldt, Gitte Bjørg (Intern)
Supervisor:
Hartvig, Niels Væver (Ekstern)
Main Supervisor:
Rootzén, Helle (Intern)
Examiner:
Kulahci, Murat (Intern)
**Financing sources**
Source: Internal funding (public)
Name of research programme: ErhvervsPhD-ordningen VTU
Project: PhD

**Sensometri, Kvalitetsikring og optimal udnyttelse af sensoriske profil data**
Department of Informatics and Mathematical Modeling
Period: 01/10/2005 → 31/01/2009
Number of participants: 2
Phd Student:
Sommer, Niels Axel Bucumi (Intern)
Main Supervisor:
Brockhoff, Per B. (Intern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: DTU, Samfinansiering
Project: PhD

**Signalbehandling for proactive pervasive computing**
Department of Informatics and Mathematical Modeling
Period: 01/10/2005 → 05/05/2009
Number of participants: 5
Phd Student:
Nielsen, Andreas Brinch (Intern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Larsen, Jan (Ekstern)
Jensen, Søren Holdt (Intern)
Oja, Erkki (Ekstern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

**Logic-Based Solver Technology**
Department of Informatics and Mathematical Modeling
Period: 15/09/2005 → 25/03/2009
Number of participants: 5
Phd Student:
Zhang, Ye (Intern)
Main Supervisor:
Nielsen, Flemming (Intern)
Examiner:
Fischer, Paul (Intern)
Hankin, Chris (Ekstern)
Jensen, Thomas (Intern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: Programbevilling
Project: PhD
Validation of Security Properties in Network Systems
Department of Informatics and Mathematical Modeling
Period: 15/09/2005 → 05/05/2009
Number of participants: 6
Phd Student:
Nielsen, Christoffer Rosenkilde (Intern)
Supervisor:
Nielsen, Flemming (Intern)
Main Supervisor:
Nielsen, Hanne Riis (Intern)
Examiner:
Fischer, Paul (Intern)
Mycroft, Alan (Ekstern)
Viganò, Luca (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Digital Signatures
Project to consider elliptic and hyperelliptic curve cryptography as an alternative to existing public-key systems.
Investigation of the interplay between the public-key systems and hash functions to ensure good performance and security.

Department of Mathematics
Period: 01/09/2005 → 31/08/2008
Number of participants: 4
Project participant:
Lange, Tanja (Intern)
Thomsen, Søren Steffen (Intern)
Birkner, Peter (Intern)
Project Manager, organisational:
Knudsen, Lars Ramkilde (Intern)

Financing sources
Source: Forskningsrådene - STVF
Name of research programme: Forskningsrådene - STVF
Amount: 3,000,000.00 Danish Kroner
Project

Mikro- og nanofluiders dynamik
Nonlinear acoustic wave phenomena, including shock waves, with relation to micro and nano fluids. Acoustic streaming.

Department of Mathematics
Period: 01/09/2005 → 31/08/2008
Number of participants: 1
Project participant:
Rasmussen, Anders Rønne (Intern)

Financing sources
Source: Ph.d Central finsieret
Name of research programme: Ph.d Central finsieret
Amount: 1,400,000.00 Danish Kroner
Project

Mikro- og nanofluiders dynamik
Period: 01/09/2005 → 26/08/2009
Number of participants: 5
Phd Student:
Rasmussen, Anders Rønne (Intern)
Supervisor:
Bruus, Henrik (Intern)
Main Supervisor:
Sørensen, Mads Peter (Intern)
Examiner:
Bohr, Tomas (Intern)
Jordan, Pedro M. (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Numerisk approksimation af rand-kontrol problemer
Department of Mathematics
Number of participants: 7
Phd Student:
Mariegaard, Jesper Sandvig (Intern)
Supervisor:
Hansen, Per Christian (Intern)
Pedersen, Michael (Intern)
Main Supervisor:
Knudsen, Kim (Intern)
Examiner:
Sørensen, Mads Peter (Intern)
Hesthaven, Jan (Intern)
Hugger, Jens (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Læring og Interaktionsdesign af tekst input på mobile enheder
Department of Informatics and Mathematical Modeling
Period: 01/08/2005 → 01/07/2009
Number of participants: 6
Phd Student:
Proschowsky, Morten Smidt (Intern)
Supervisor:
Schultz, Nette (Intern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Larsen, Jan (Ekstern)
Dunlop, Mark (Ekstern)
Sikström, Sverker (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD
Lay-out design of advanced pump-heads
Department of Mathematics
Period: 01/08/2005 → 31/12/2005
Number of participants: 3
Project participant:
Schou, Marie-Louise Højlund (Intern)
Stolpe, Mathias (Intern)
Bendsoe, Martin P. (Intern)

Financing sources
Source: Indtægtsdækket virksomhed UK 90
Name of research programme: Indtægtsdækket virksomhed UK 90
Amount: 70,000.00 Danish Kroner

Mean Distance, Curvature and Symmetry
We study measure theoretic metric invariants on metric spaces, with a view towards obtaining new invariants, which in combination can be powerful tools to describe the geometry of spaces/objects. An objective is to be able to describe the symmetry of an object via an invariant called symmetry ratio. A large range of metric spaces support these invariants. A fundamental idea in the project is to extend the classes of spaces, where it is possible to apply classical analysis tools by establishing a framework for translations and generalizations. In the other direction, we can also utilize this setup to get an influx of new ideas in the classical setting.

Mean Distance, Curvature and Symmetry
Department of Mathematics
Period: 01/08/2005 → 01/11/2007
Number of participants: 1
Project Manager, organisational:
Kokkendorff, Simon Lyngby (Intern)

Financing sources
Source: Forskningsrådene - SNF
Name of research programme: Forskningsrådene - STVF
Amount: 1,191,276.98 Danish Kroner

Probabilistic Methods in Multiple Target Tracking
Department of Informatics and Mathematical Modeling
Period: 01/08/2005 → 18/08/2010
Number of participants: 4
Phd Student:
Brink, Frederik Ettrup (Intern)
Supervisor:
Dall, Jørgen (Intern)
Tuxen, Fredrik (Ekstern)
Main Supervisor:
Hansen, Lars Kai (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: ErhvervsPhD-ordningen VTU
Project: PhD

Wavelet Frames in theory and Practice
Department of Mathematics
Period: 01/08/2005 → 05/11/2008
Number of participants: 5
Phd Student:
Lemvig, Jakob (Intern)
Main Supervisor:
Christensen, Ole (Intern)
CT Scanning and Automated Segmentation of Pig Bodies

Department of Informatics and Mathematical Modeling
Period: 01/07/2005 → 11/02/2009
Number of participants: 6
Phd Student:
Vester-Christensen, Martin (Intern)
Supervisor:
Christensen, Lars Bager (Intern)
Main Supervisor:
Larsen, Rasmus (Intern)
Examiner:
Nielsen, Allan Aasbjerg (Intern)
Allen, Paul (Ekstern)
Barillot, Christian (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnnet stipendie
Project: PhD

Shape Analysis of the Dynamics of the Human Ear Canal

Department of Informatics and Mathematical Modeling
Period: 01/07/2005 → 30/01/2009
Number of participants: 7
Phd Student:
Darkner, Sune (Intern)
Supervisor:
Olsen, Ole Fogh (Ekstern)
Paulsen, Rasmus Reinhold (Intern)
Main Supervisor:
Larsen, Rasmus (Intern)
Examiner:
Carstensen, Jens Michael (Intern)
Ahlberg, Jørgen (Ekstern)
Lorenz, Cristian (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU, Samfinansiering
Project: PhD

Scientific Computing and Parallel Algorithms in Computational Nano science

Department of Informatics and Mathematical Modeling
Period: 15/04/2005 → 02/07/2008
Number of participants: 7
Phd Student:
Sørensen, Hans Henrik Brandenborg (Intern)
Supervisor:
Skelboe, Stig (Ekstern)
Stokbro, Kurt (Intern)
Main Supervisor:
Hansen, Per Christian (Intern)
Examiner:
Sørensen, Mads Peter (Intern)
Darve, Eric (Ekstern)
Wacker, Andreas (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering
Project: PhD

Optimal insulation problems
Two formulations for the design of the optimal insulation of a domain have been investigated by computational means. One method is in the format of a topology design problem of distributing insulating material in a domain surrounding a non-design domain that is heated by a given heat-source; this problem is treated in both a relaxed format as well as a penalized material format. The other approach deals with the optimal distribution of a thin layer of insulation on the boundary of the non-design domain; this problem is more in the realm of shape design, or rather, it is similar to optimal design of support conditions for structures. In both cases mathematical programming is used, but for the shape design case it is applied to the non-linear analysis problems that arise when the optimal design is explicitly solved for. The computational results illustrate the similarities and differences that result from the two approaches.

Department of Mathematics
Ecole Polytechnique
Period: 01/04/2005 → 01/01/2006
Number of participants: 3
Project participant:
Bendsøe, Martin P. (Intern)
Munoz, Eduardo (Ekstern)
Allaire, Gregoire (Ekstern)

Financing sources
Source: Gaver, Private danske Fonde
Name of research programme: Gaver, Private danske Fonde
Amount: 25,000.00 Danish Kroner

Pattern-oriented Formal Software Development
L'objectif de ce projet est de fournir une méthode pratique pour le développement efficace de logiciel correct. Il est reconnu que ce sont les premières étapes du développement du logiciel qui sont cruciales pour parvenir à la meilleure adéquation entre les besoins exprimés et la réalisation proposée, et pour éliminer au maximum toute source d'erreur. Ceci est particulièrement important pour les applications "critiques", tels que les systèmes de contrôle des trains, où des erreurs peuvent entraîner la perte de vies humaines. L'accent est donc mis tout d'abord sur une expression précise et non ambiguë des besoins dans les spécifications. Différentes approches sont proposées pour aller dans ce sens, avec leurs avantages et inconvénients respectifs. Les spécifications formelles, par leur expression précise, conduisent à se poser des questions qui font progresser dans la compréhension du problème à traiter. Un écueil demeure, c'est celui de la taille et/ou de la complexité, qui rendent malaisée la compréhension synthétique et peuvent égarer dans la démarche. Notre approche est d'utiliser les "patterns" pour aider à maîtriser la complexité des problèmes dans le démarche de spécification. Les "patterns" (traduits par schémas ou patrons) proposent des familles de structures fréquemment rencontrées que l'utilisateur est invité à "essayer" (quitte à les adapter) sur le problème à traiter pour ainsi bénéficier de concepts structurants en "prêt à porter". Les "patterns" [4] peuvent donc être vus comme un moyen élaboré de réutiliser des connaissances acquises par l'expérience. Un "problem frame" [8] est un schéma qui définit de manière intuitive une classe de problèmes identifiée en termes de son contexte et des caractéristiques de ses domaines, de ses interfaces et des besoins. C'est donc un "pattern" à utiliser dès le début de l'analyse d'un problème pour permettre de reconnaître des structures utiles pour la compréhension. Une méthode de développement de logiciel s'appuyant sur les "patterns" a été proposée dans [3] et développée également dans [2]. L'idée de cette méthode est d'associer à chaque instance de problem frame un schéma de spécification formelle correspondante qui puisse être instantié pour un problème concret. Le langage de spécification à utiliser de préférence peut varier selon le problem frame choisi. Dans [3,2] cette idée a été illustrée en utilisant les langages de spécification formelle CASL [1], CASL-LTL [9], et LOTOS), mais d'autres langages, tels que RSL [5] pourraient être utilisés. RSL est un langage de spécification qui s'est avéré utile pour le développement...
Degner, Thomas (Ekstern)
McArthur, Stephen (Ekstern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: Risø (Len)
Project: PhD

**START - Application to EU-Aero : PLATO-N**
Project for the coordination and compilation of a EU-Aero project on the optimal design of large-scale composite structures.

Department of Mathematics
Period: 01/04/2005 → 15/07/2005
Number of participants: 1
Project Manager, organisational:
Bendsøe, Martin P. (Intern)

**Financing sources**
Source: Forskningsrådene - STVF
Name of research programme: Forskningsrådene - STVF
Amount: 75,600.00 Danish Kroner

**Design of pump geometry**
Analysis and design of some parts of a pump-system. Work resulted in a new geometry being applied by the company sponsoring the work.

Department of Mathematics
Period: 01/03/2005 → 31/05/2005
Number of participants: 5
Contact person:
Bendsøe, Martin P. (Intern)
Project participant:
Gravesen, Jens (Intern)
Røgen, Peter (Intern)
Markvorsen, Steen (Intern)
Stolpe, Mathias (Intern)

**Financing sources**
Source: Indtægtsdækket virksomhed UK 90
Name of research programme: Indtægtsdækket virksomhed UK 90
Amount: 72,500.00 Danish Kroner

**Integration and Modeling of Medical Signals**
Department of Informatics and Mathematical Modeling
Period: 01/03/2005 → 29/09/2008
Number of participants: 7
Phd Student:
Mørup, Morten (Intern)
Supervisor:
Amfred, Sidse Marie (Ekstern)
Winther, Ole (Intern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Larsen, Jan (Ekstern)
Bro, Rasmus (Intern)
Müller, Klaus-Robert (Ekstern)
Mathematical Coding Theory
Error-correcting codes are essential in modern communication systems. The codes are constructed and analysed using advanced mathematics in many different ways. The main purpose of this project is construction and analysis of optimal codes and their en- and decoding algorithms. CODES ON GRAPHS Graph based codes is a way to construct good codes with low decoding complexity. Most of the results however are asymptotic. We construct specific codes based on earlier results on concatenated codes and codes based on finbite geometries. DECODING OF REED_SOLOMON CODES AND CONCATENATED CODES. New versions of decoding methods for Reed-Solomon codes give opportunities for correcting more errors than hitherto. We improve on these results. ALGEBRAIC GEOMETRY CODES Codes based on algebraic geometry can be shown to be better than the classical constructions. We construct and analyse some classes of AG-codes and their decoding algorithms.

Department of Mathematics
Department of Photonics Engineering
University of Copenhagen
Aarhus University
Aalborg University

Period: 01/03/2005 → 28/02/2008
Number of participants: 7
Project ID: 10061

Project participant:
Justesen, Jørn (Intern)
Topsøe, Flemming (Ekstern)
Harremoes, Peter (Ekstern)
Hansen, Johan P. (Ekstern)
Geil, Olav (Ekstern)
Thommesen, Christian (Ekstern)

Project Manager, organisational:
Høholdt, Tom (Intern)

Financing sources
Source: Forskningsrådene - SNF
Name of research programme: Forskningsrådene - STVF
Amount: 630,000.00 Danish Kroner
**Content Management in a Converging Media World**

Department of Informatics and Mathematical Modeling  
Period: 01/02/2005 → 25/03/2009  
Number of participants: 6  
Phd Student: Butkus, Andrius (Intern)  
Supervisor: Tadayoni, Reza (Intern)  
Main Supervisor: Olesen, Henning (Intern)  
Examiner: Havn, Erling C. (Intern)  
Arde, Anders (Intern)  
David, Klaus (Ekstern)  

**Financing sources**  
Source: Internal funding (public)  
Name of research programme: DTU-lønnet stipendie  
Project: PhD

**Development of Clinical Spectroscopy with High Field MR-scanners**

Department of Informatics and Mathematical Modeling  
Period: 01/02/2005 → 31/03/2010  
Number of participants: 6  
Phd Student: de Nijs, Robin (Intern)  
Supervisor: Hanson, Lars G. (Intern)  
Main Supervisor: Hansen, Lars Kai (Intern)  
Examiner: Larsen, Jan (Ekstern)  
Björkman-Burtscher, Isabella M. (Ekstern)  
Lonsdale, Markus Nowak (Intern)  

**Financing sources**  
Source: Internal funding (public)  
Name of research programme: Forskningsrådsstipendium  
Project: PhD

**Geometrisk analyse af transportfænomener via sammenligningsteori for Laplace-operatorer**

Department of Mathematics  
Period: 01/02/2005 → 31/07/2005  
Number of participants: 2  
Phd Student: Mumm, Andrew Christian (Intern)  
Main Supervisor: Markvorsen, Steen (Intern)  

**Financing sources**  
Source: Internal funding (public)  
Name of research programme: DTU-lønnet stipendie  
Project: PhD
In silico ADME classification of chemical (NCE) and biological (NBE) drug candidates

Department of Informatics and Mathematical Modeling
Period: 01/02/2005 → 07/09/2006
Number of participants: 6
Phd Student:
Hagen, Berith Fredsted (Intern)
Supervisor:
Refsgaard, Hanne (Intern)
Main Supervisor:
Brockhoff, Per B. (Intern)
Examiner:
Larsen, Rasmus Werner (Intern)
Jørgensen, Flemming Steen (Ekstern)
Næs, Tormod (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: ErhvervsPhD-ordningen VTU
Project: PhD

Kvantitativ tractografi: Statistisk modellering af hjernens neurale forbindelser med diffusion tensor imaging

Department of Informatics and Mathematical Modeling
Period: 01/02/2005 → 28/11/2008
Number of participants: 7
Phd Student:
Dyrby, Tim Bjørn (Intern)
Supervisor:
Baaré, William F. C. (Ekstern)
Waldemar, Gunhild (Ekstern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Winther, Ole (Intern)
Poline, Jean-Baptiste (Ekstern)
Stødkilde-Jørgensen, Hans (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Ansat eksternt
Project: PhD

Modellering af biologisk diversitet hos grise

Department of Informatics and Mathematical Modeling
Period: 01/02/2005 → 02/02/2009
Number of participants: 6
Phd Student:
Erbou, Søren Gylling Hemmingsen (Intern)
Supervisor:
Christensen, Lars Bager (Intern)
Main Supervisor:
Ersbøll, Bjarne Kjaer (Intern)
Examiner:
Aanaes, Henrik (Intern)
Darvann, Tron Andre (Intern)
Vangen, Odd (Ekstern)

Financing sources
Source: Internal funding (public)
Signal separation using independent component analysis with explicit source modelling

Department of Informatics and Mathematical Modeling
Period: 01/02/2005 → 28/01/2009
Number of participants: 4
Phd Student:
  Schmidt, Mikkel Nørgaard (Intern)
Main Supervisor:
  Larsen, Jan (Intern)
Examiner:
  Hansen, Lars Kai (Intern)
  Jutten, Christian (Ekstern)

Financing sources
Source: Internal funding (public)

Understanding Multi-Agent Sound Environments

Department of Informatics and Mathematical Modeling
Period: 01/02/2005 → 28/11/2008
Number of participants: 5
Phd Student:
  Feng, Ling (Intern)
Main Supervisor:
  Hansen, Lars Kai (Intern)
Examiner:
  Larsen, Jan (Ekstern)
  Honkela, Timo (Ekstern)
  Kyllingsbæk, Søren (Intern)

Financing sources
Source: Internal funding (public)

Cryptoanalysis of Secret-Key Cryptosystems

Department of Mathematics
Period: 01/01/2005 → 25/03/2009
Number of participants: 5
Phd Student:
  Miolane, Charlotte Vikkelsø (Intern)
Main Supervisor:
  Knudsen, Lars Ramkilde (Intern)
Examiner:
  Høholdt, Tom (Intern)
  Johansson, Thomas (Ekstern)
  Preneel, Bart Karel Benedikt (Ekstern)

Financing sources
Source: Internal funding (public)
**Forskningsophold i Brisbane Australien**

Department of Mathematics  
Period: 01/01/2005 → 30/06/2006  
Number of participants: 1  
Project Manager, organisational:  
Knudsen, Lars Ramkilde (Intern)

**Financing sources**  
Source: Forskningsrådene - STVF  
Name of research programme: Forskningsrådene - STVF  
Amount: 167,172.00 Danish Kroner  
Project

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**Statisk analyse af kritiske software systemer**

Department of Informatics and Mathematical Modeling  
Period: 01/01/2005 → 26/06/2005  
Number of participants: 3  
Phd Student:  
Hansen, Steffen Michael (Ekstern)  
Supervisor:  
Nielsen, Flemming (Intern)  
Main Supervisor:  
Nielsen, Hanne Riis (Intern)

**Financing sources**  
Source: Internal funding (public)  
Name of research programme: DTU-lønnet stipendie  
Project: PhD

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**Topological derivatives and generalized shape design**

In this project we have developed a fictitious domain method for topology optimization in which the boundary of the optimal design is identified by a level set of the topological derivative field of the objective function that satisfies a given resource constraint. The response analysis employs a smooth and consistent projection of the geometry onto the fictitious analysis domain. We use a simple fixed-point iteration algorithm to solve the optimization problem. The geometry projection delivers smooth and accurate representations of the variable structural boundary. This enhances convergence of the optimization algorithm and supports the reintroduction of solid material in void regions, a critical requirement for robust topology optimization. Several examples for compliance minimization subject to a volume resource constraint have been solved.

Department of Mathematics  
University of Illinois  
Period: 01/01/2005 → 31/12/2006  
Number of participants: 3  
Project participant:  
Bendsøe, Martin P. (Intern)  
Haber, Robert B. (Ekstern)  
Totorelli, Daniel (Ekstern)

**Financing sources**  
Source: [Ordinær drift UK 10]  
Name of research programme: [Ordinær drift UK 10]  
Amount: 50,000.00 Danish Kroner  
Source: Gaver, Private danske Fonde  
Name of research programme: Gaver, Private danske Fonde  
Amount: 25,000.00 Danish Kroner  
Project

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**Matematisk kodningsteori**

Department of Mathematics
Cryptographic Access Control

Department of Informatics and Mathematical Modeling
Number of participants: 2
Phd Student:
Frank, Kristine (Ekstern)
Main Supervisor:
Jensen, Christian D. (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Global Illumination - Anvendelse af dynamiske løsningsrum i spil og animation

Department of Informatics and Mathematical Modeling
Period: 01/11/2004 → 29/05/2008
Number of participants: 6
Phd Student:
Frisvad, Jeppe Revall (Intern)
Supervisor:
Falster, Peter (Intern)
Main Supervisor:
Christensen, Niels Jørgen (Intern)
Examiner:
Carstensen, Jens Michael (Intern)
Henriksen, Knud (Ekstern)
Myszkowski, Karol (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Modeling the Effects of Drugs Targetes to Tumor Vasculature using MRI

Department of Informatics and Mathematical Modeling
Period: 01/11/2004 → 05/11/2008
Number of participants: 7
Phd Student:
Holm, David Alberg (Intern)
Supervisor:
Rowland, Ian (Ekstern)
Sidros, Karam (Intern)
Main Supervisor:
Larsen, Rasmus (Intern)
Examiner:
Ersbøll, Bjarne Kjær (Intern)
Models and methods for large-scale structural topology optimization with stress and displacement constraints

One of the major outstanding challenges within the field of topology optimization is the development of optimization models which take local stress constraints into account in a physical consistent way and for which it is also possible to device optimization methods capable of reliably solving large-scale problems. These problem types are of significant importance for applications since the appearance of high local stresses may lead to the failure of a structure (by fatigue or fracture) and many structural designs are driven by weight and strength considerations. The purpose of the project is therefore to develop mathematical models based on an integer format of the design problem such that local stress and other constraints can be modeled in an unambiguous fashion. This will be combined with numerical methods capable of providing provably good feasible solutions to large-scale problems in which local stress and displacement constraints are included. The emphasis of the project will be on topology optimization of discretized continuum structures, where the topology design determines the number, positions, and shape of the holes of the structure and the shape of the outer boundaries. The proposed models and methods should be general enough to be used in other areas, for example in the design of the lay-up of laminates from a discrete set of plies and this problem will also be dealt with.

Department of Mathematics
Period: 01/11/2004 → 31/10/2006
Number of participants: 1
Project Manager, organisational:
Stolpe, Mathias (Intern)

Financing sources
Source: Forskningsrådene - STVF
Name of research programme: Forskningsrådene - STVF
Amount: 1,401,000.00 Danish Kroner
Project

Power Fluctuations from Large Offshore Wind Farms

The project has developed and verified simulation and prediction models for power fluctuations in large wind farms. The verification is based on ex-tensive measurements in the two large offshore wind farms in Denmark: Horns Rev and Nysted. The models can also be applied to simulation of wind power fluctuations from wind turbines distributed over a larger area than a wind farm. The advantage of the prediction models is that they can be applied in the operation, but these models require a training period be-fore they work in a new system. On the other hand, the simulation model can
simulate power fluctuations with possible future wind power developments, based on information about size and location of the individual wind turbines. Thus, the simulation model is a planning tool.

Department of Wind Energy
Wind Energy Systems
Risø National Laboratory for Sustainable Energy
Department of Applied Mathematics and Computer Science
DONG Energy A/S
Vattenfall A/S
Period: 01/10/2004 → 31/03/2007
Number of participants: 4
Project participant:
Cutululis, Nicolaos Antonio (Intern)
Madsen, Henrik (Intern)
Pinson, Pierre (Intern)
Project Manager, academic:
Sørensen, Poul Ejnar (Intern)

Relations
Publications:
Modelling of power fluctuations from large offshore wind farms
Power fluctuations from large offshore wind farms
Analysis of the experimental spectral coherence in the Nysted Wind Farm
Models for assessing power fluctuations from large wind farms
Fluctuations of offshore wind generation: Statistical modelling
Power Fluctuations From Large Wind Farms
Regime-switching modelling of the fluctuations of offshore wind generation

Geometriske aspekter af proteiner
Department of Mathematics
Period: 15/09/2004 → 31/01/2008
Number of participants: 6
Phd Student:
Hansen, Mikael Sonne (Intern)
Supervisor:
Røgen, Peter (Intern)
Main Supervisor:
Hansen, Vagn Lundsgaard (Intern)
Examiner:
Markvorsen, Steen (Intern)
Delarue, Marc (Ekstern)
Hamelryck, Thomas (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Continuing education voucher systems: A flexible and targeted statistics programme based on learning objects and blended learning
Learning should be fun as well as inspiring and innovative. What you learn should be directly applicable to your daily work and should help you see things in a new perspective, and your studies should fit into a busy life. Who of us has not tried to return home from a course, putting the briefcase away and shelving the hand-outs, only to forget the knowledge acquired during the excellent course because it was not really applicable to our daily work, and because there is not time during an ordinary working day to put acquired theories into practice. The world around us changes so fast that life-long learning is a prerequisite for possessing the competencies demanded by the business sector. Today, data analysis is used in practically all areas of society and plays an important role in almost any company. Many employees find it important to be
familiar with data analysis and able to apply statistical methods – competencies that will increase the quality of their company and save it considerable expense. So we need a new type of continuing education that will reflect a rethinking of content, form and duration. In the future, continuing education will be in the form of voucher systems. You may attend the specific chunk of a study programme you require whenever it suits you and pay only for what you get. If continuing education is to be attractive to employees as well as companies, study programmes must meet the following requirements: • It should be possible to follow a programme in parallel with an ordinary job • It should be possible to work on study projects at your leisure. • Knowledge gained from a study programme should be directly applicable to your daily work. If the providers are to meet these requirements, the task of developing new study courses and tailor these to new students must be manageable. We have therefore proposed a new type of research-based continuing education courses. These courses are structured around ‘learning objects’, i.e. short complete education sessions, which may be combined in various ways according to the students’ interests and levels. We combine them with ‘blended learning’, i.e. a combination of e-learning, web-based learning and face-to-face learning.

Department of Informatics and Mathematical Modeling

Aarhus University

Coloplast Danmark A/S
Period: 01/09/2004 → 31/12/2007
Number of participants: 3
Project participant:
Jacobsen, Lotte (Ekstern)
Project Manager, organisational:
Rootzén, Helle (Intern)
Højsgaard, Søren (Ekstern)

Financing sources
Source: Forskningsprojekter - Andre ministerier og styrelser
Name of research programme: Forskningsprojekter - Andre ministerier og styrelser
Amount: 3,065,798.00 Danish Kroner
Project

Funktionelle hjernebilleder - Modellering og data-analyse
Department of Informatics and Mathematical Modeling
Period: 01/09/2004 → 17/06/2009
Number of participants: 8
Phd Student:
Madsen, Kristoffer Hougaard (Intern)
Supervisor:
Larsen, Axel (Ekstern)
Lund, Torben E. (Ekstern)
Sidaros, Karam (Intern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Larsen, Jan (Ekstern)
Adali, Tulay (Ekstern)
Kjær, Troels Wesenberg (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønned stipendie
Project: PhD

Secure Communication Protocols
Department of Informatics and Mathematical Modeling
Period: 01/09/2004 → 29/05/2008
Number of participants: 5
Phd Student:
Gao, Han (Intern)
Main Supervisor:
Nielsen, Hanne Riis (Intern)
Examiner: Baumeister, Hubert (Intern)
Cortesi, Agostino (Ekstern)
Gilmore, Stephen (Ekstern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: Programbevilling
Project: PhD

**Simulering og kontrol af ikke-holonne mekaniske systemer**
Department of Mathematics
Period: 01/09/2004 → 17/01/2008
Number of participants: 6
Phd Student:
Nordkvist, Nikolaj (Intern)
Supervisor:
Bullo, Francesco (Ekstern)
Main Supervisor:
Hjorth, Poul G. (Intern)
Examiner:
Ravn, Ole (Intern)
Stramigioli, Stefano (Ekstern)
Wisniewski, Rafal (Ekstern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: DTU-lønned stipendie
Project: PhD

**Ubiquitous Mobility in Personal and Personal Area Networks**
Department of Informatics and Mathematical Modeling
Period: 01/09/2004 → 30/04/2008
Number of participants: 6
Phd Student:
Christensen, Dan Saugstrup (Intern)
Supervisor:
Tadayoni, Reza (Intern)
Main Supervisor:
Skouby, Knud Erik (Intern)
Examiner:
Falch, Morten (Intern)
Dalum, Bent (Ekstern)
Hämmäinen, Heikki (Ekstern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: Kandidatstipendium ansat på DT
Project: PhD

**Nonlinear p-Laplacian Comparison Theory**
We use drifted Brownian motion in tailor made warped product model spaces as comparison constructions to study $p$-hyperbolicity and $p$-parabolicity of a large class of submanifolds in ambient spaces with restricted curvature behaviour. It is expected that similar techniques will also give generalized isoperimetric inequalities as well as $p$-Laplace heat kernel estimates and mean exit time estimates for the corresponding nonlinear diffusion.

Department of Mathematics
Period: 01/08/2004 → 01/08/2020
Number of participants: 3

p-Laplace comparison theory

Project participant:
Markvorsen, Steen (Intern)
Holopainen, Ilkka (Ekstern)
Palmer, Vicente (Ekstern)

Financing sources
Source: Forskningsrådene - SNF
Name of research programme: Forskningsrådene - STVF
Amount: 20,000.00 Danish Kroner

Large-Scale Structural Topology Optimization

Department of Mathematics
Number of participants: 1

Project participant:
Stolpe, Mathias (Intern)

Financing sources
Source: Forskningsrådene - STVF
Name of research programme: Forskningsrådene - STVF
Amount: 1,401,000.00 Danish Kroner

Aasted-mikroverk ApS

Department of Mathematics
Period: 10/06/2004 → 01/12/2004
Number of participants: 1

Project participant:
Bendsøe, Martin P. (Intern)

Financing sources
Source: Indtægtsdækket virksomhed UK 90
Name of research programme: Indtægtsdækket virksomhed UK 90
Amount: 47,150.00 Danish Kroner

51st European Study Group with Industry

A Study Group is a forum where academic mathematicians work on problems directly related to industry. Workshops of this nature have taken place in Great Britain for a number of years, going back to 1963 when Prof. Alan Tayler started the Oxford Study Group with Industry. The coordination of Study Groups is now in the hands of European Consortium for Mathematics in Industry (ECMI), and the name is currently European Study Group with Industry (ESGI). At a meeting in 1997 of the ECMI Council it was decided that Study Groups should also be held outside Great Britain, and the first one of those was ESGI32 in Lyngby, Denmark. The format of a Study Group is a week long meeting (Monday - Friday) where a number of companies on the first day of the meeting each present a research problem they believe to be of a mathematical nature. Each such problem is taken up by a group of mathematicians who, together with the company representative, work towards the solution of the problem, through Thursday afternoon. Friday is used to present in a plenary session the results from each of the problem groups. The reasons for the continuing success of the Study Groups are simple: The industrial participants get, for a very modest sum, a highly qualified ‘think tank’ of mathematicians to focus on their particular research problem. Besides a full or partial resolution of the problem, the companies establish useful contacts with international researchers. The academics benefit from new ideas and challenges from the real world, providing inspiration for both education and their own research. The success criterion for a Study Group is that participating companies experience the meeting as useful and that it brings them a significant step closer to the resolution of their problem. For the Danish study groups we also have the goal that it will establish closer ties between Danish Industry and Danish mathematicians.

Department of Mathematics
University of Southern Denmark
Period: 01/06/2004 → 31/12/2004
Number of participants: 4
Acronym: ESGI51
Project ID: 10055
Project participant:
Gravesen, Jens (Intern)
Hjorth, Poul G. (Intern)
Petersen, Henrik Gordon (Ekstern)
Willatzen, Morten (Ekstern)

Financing sources
Source: Udenfor rammen
Name of research programme: Ukendt
Amount: 45,000.00 Danish Kroner
Project

Sound Classification and Sound Separation for Hearing Instruments
Department of Informatics and Mathematical Modeling
Period: 01/06/2004 → 30/04/2008
Number of participants: 6
Phd Student:
Beierholm, Thomas (Intern)
Supervisor:
Vries, Bert de (Ekstern)
Main Supervisor:
Winther, Ole (Intern)
Examiner:
Larsen, Jan (Ekstern)
Godsill, Simon J. (Ekstern)
Jensen, Søren Holdt (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: ErhvervsPhD-ordningen VTU
Project: PhD

System-Level Design Methodologies for Platform-based Multiprocessor SoC Designs
Department of Informatics and Mathematical Modeling
Period: 01/06/2004 → 05/11/2008
Number of participants: 5
Phd Student:
Virk, Kashif Munir (Intern)
Main Supervisor:
Madsen, Jan (Intern)
Examiner:
Nannarelli, Alberto (Intern)
Jerraya, Ahmed Amine (Ekstern)
Nummi, Jari Antero (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Offentlig finansiering
Project: PhD

Thomas Britz
Department of Mathematics
Period: 05/05/2004 → 31/10/2005
Number of participants: 1
Project participant:
Thomassen, Carsten (Intern)

**Financing sources**
Source: Gaver, Private danske Fonde
Name of research programme: Gaver, Private danske Fonde
Amount: 440,000.00 Danish Kroner

**State Space Models of Sound Environments - Analysis by Synthesis**
Department of Informatics and Mathematical Modeling
Period: 01/05/2004 → 05/11/2007
Number of participants: 5
Phd Student:
Olsson, Rasmus Kongsgaard (Ekstern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Larsen, Jan (Ekstern)
Anemüller, Jörn (Ekstern)
Jensen, Søren Holdt (Intern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: Eksternt finansieret virksomhed
Project: PhD

**Stochastic Scheduling in Production Planning**
Department of Informatics and Mathematical Modeling
Period: 01/04/2004 → 31/01/2008
Number of participants: 5
Phd Student:
Rasmussen, Kourosh Marjani (Intern)
Main Supervisor:
Clausen, Jens (Intern)
Examiner:
Stidsen, Thomas Jacob Riis (Intern)
Sørensen, Peter Norman (Ekstern)
Vladimirou, Hercules (Ekstern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

**Adaptive Computing Architectures**
Department of Informatics and Mathematical Modeling
Period: 01/03/2004 → 17/01/2008
Number of participants: 4
Phd Student:
Wu, Kehuai (Intern)
Main Supervisor:
Madsen, Jan (Intern)
Examiner:
Kuchcinski, Krzysztof (Ekstern)
Teich, Jürgen (Ekstern)
**Financing sources**  
Source: Internal funding (public)  
Name of research programme: DTU-lønnet stipendie  
Project: PhD

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**Dynamical Shape analysis**  
Department of Informatics and Mathematical Modeling  
Period: 01/03/2004 → 30/04/2008  
Number of participants: 6  
Phd Student:  
Ólafsdóttir, Hildur (Intern)  
Supervisor:  
Larsen, Rasmus (Intern)  
Main Supervisor:  
Ersbøll, Bjarne Kjær (Intern)  
Examiner:  
Carstensen, Jens Michael (Intern)  
Rueckert, Daniel (Ekstern)  
Vannier, Michael W. (Ekstern)

**European Network of Excellence for Cryptology**  
ECRYPT - European Network of Excellence for Cryptology is a 4-year network of excellence funded within the Information Societies Technology (IST) Programme of the European Commission's Sixth Framework Programme (FP6) under contract number IST-2002-507932. It falls under the action line Towards a global dependability and security framework. ECRYPT was launched on February 1st, 2004. Its objective is to intensify the collaboration of European researchers in information security, and more in particular in cryptology and digital watermarking. Overall budget is about DKK 35,000,000

Department of Mathematics  
Period: 01/02/2004 → 31/07/2008  
Number of participants: 5  
Cryptology  
Acronym: ECRYPT  
Project participant:  
Lange, Tanja (Intern)  
Miolane, Charlotte Vikkelsø (Intern)  
Thomsen, Søren Steffen (Intern)  
Birkner, Peter (Intern)  
Project Manager, organisational:  
Knudsen, Lars Ramkilde (Intern)

**Financing sources**  
Source: Forsk. EU - Andre EU-midler  
Name of research programme: Forsk. EU - Andre EU-midler  
Amount: 600,000.00 Danish Kroner  
Project

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**Matematisk modellering af multimedie netværk**  
Department of Informatics and Mathematical Modeling  
Period: 01/02/2004 → 03/09/2007  
Number of participants: 5  
Phd Student:  
Jørgensen, Sune Lehmann (Intern)  
Main Supervisor:  
Hansen, Lars Kai (Intern)
Examiner:
Larsen, Jan (Ekstern)
Cox, Ingemar (Intern)
Johansen, Peter (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Security in Grid Systems
Department of Informatics and Mathematical Modeling
Period: 01/02/2004 → 31/03/2005
Number of participants: 3
Phd Student:
Kampfeldt, Jesper (Intern)
Supervisor:
Jensen, Christian D. (Intern)
Main Supervisor:
Sharp, Robin (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU, Samfinansiering
Project: PhD

Topologioptimering af strømninger under multifysisk belastning
Department of Mathematics
Period: 01/02/2004 → 31/05/2007
Number of participants: 6
Phd Student:
Gersborg, Allan Roulund (Intern)
Supervisor:
Sigmund, Ole (Intern)
Main Supervisor:
Bendsøe, Martin P. (Intern)
Examiner:
Lund, Erik (Ekstern)
Othmer, Carsten (Ekstern)
Pironneau, Olivier (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Chromatic numbers and graph decomposition
Department of Mathematics
Period: 01/01/2004 → 01/01/2014
Number of participants: 1
Project Manager, organisational:
Thomassen, Carsten (Intern)

Topological design optimization of structures, machines and materials: IUTAM-SYMPOSIUM
It is now more than 15 years ago that the so-called homogenization method was proposed as a basis for computational means to optimize the topology and shape of continuum structures. From initially being capable mainly of treating minimum compliance design we now see the basic material distribution idea of the methodology applied to a wide range of structural and mechanical problems as well as to problems that couple structural response to other physical responses.
Also, the method has provided insight for micro-mechanical studies, meaning that the method has given feedback to the area which provided impetus to the field of topological design optimization in its creation. Finally, topological design is now an integral part of most FEM software systems and it has become a standard industrial tool in some fields. The IUTAM Symposium provided a forum for the exchange of ideas for future developments in the area of topological design optimization. This encompassed the application to fluid-solid interaction problems, acoustics problems, and to problems in biomechanics, as well as to other multiphysics problems. New basic modelling paradigms, covering new geometry modelling such as level-set methods and topological derivatives, as well as developments in computational approaches were also focus areas. Without the sponsorship from the International Union of Theoretical and Applied Mechanics (IUTAM) and the International Society for Structural and Multidisciplinary Optimization (ISSMO), and the financial support from the Danish Center for Applied Mathematics and Mechanics (DCAMM), the Villum Kann Rasmussen Foundation, and the Poul Due Jensen Foundation, the symposium and this book would not have been possible. The financial support from the Department of Mechanical Engineering, Aalborg University, and from the Department of Mathematics and the Department of Mechanical Engineering, Technical University of Denmark, is also gratefully acknowledged.

Department of Mathematics

Department of Mechanical Engineering

Aalborg University

Period: 01/01/2004 → 31/12/2005
Number of participants: 3
Project Manager, organisational:
Bendsøe, Martin P. (Intern)
Sigmund, Ole (Intern)
Olhoff, Niels (Ekstern)

Financing sources
Source: Gaver, Private danske Fonde
Name of research programme: Gaver, Private danske Fonde
Amount: 100,000.00 Danish Kroner
Source: [Ordinær drift UK 10]
Name of research programme: [Ordinær drift UK 10]
Amount: 250,000.00 Danish Kroner

Diskret matematik

Department of Mathematics
Period: 17/12/2003 → 31/12/2006
Number of participants: 1
Project participant:
Thomassen, Carsten (Intern)

Financing sources
Source: Forskningsrådene - SNF
Name of research programme: Forskningsrådene - STVF
Amount: 735,000.00 Danish Kroner

Geometry and Global Analysis with Applications

Department of Mathematics
Period: 12/12/2003 → 31/12/2006
Number of participants: 1
Project participant:
Hansen, Vagn Lundsgaard (Intern)

Financing sources
Source: Forskningsrådene - SNF
Name of research programme: Forskningsrådene - STVF
Amount: 1,080,000.00 Danish Kroner

Automated Characterization and Recognition of 2D and 3D Brain Structure in MRI for Diagnostic Support

Department of Informatics and Mathematical Modeling
Number of participants: 5
Phd Student:
Sjöstrand, Karl (Intern)
Main Supervisor:
Larsen, Rasmus (Intern)
Examiner:
Hansen, Lars Kai (Intern)
Hastie, Trevor J. (Ekstern)
Åström, Karl (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Beslutningsstøttesystem til jagerpiloter

Department of Informatics and Mathematical Modeling
Number of participants: 7
Phd Student:
Randleff, Lars Rosenberg (Intern)
Supervisor:
Jensen, Gert Hvedstrup (Intern)
Søndergaard, Steen (Ekstern)
Main Supervisor:
Clausen, Jens (Intern)
Examiner:
Stidsen, Thomas Jacob Riis (Intern)
Birkemark, Christian M. (Ekstern)
Wright, George A. (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Ansat eksternt
Project: PhD

Multimedia Services in Residential Broadband Networks

Department of Informatics and Mathematical Modeling
Period: 01/10/2003 → 03/09/2007
Number of participants: 6
Phd Student:
Sigurdsson, Halldor Matthias (Intern)
Supervisor:
Tadayoni, Reza (Intern)
Main Supervisor:
Olesen, Henning (Intern)
Examiner:
Henten, Anders (Intern)
Arnbak, Jens Christian (Ekstern)
Olsen, Borgar T. (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Eksternt finansieret virksomhed
Project: PhD
Specification and Programming Languages for Biological Systems

Department of Informatics and Mathematical Modeling
Period: 01/10/2003 → 13/12/2007
Number of participants: 5
Phd Student:
Pilegaard, Henrik (Intern)
Supervisor:
Nielsen, Hanne Riis (Intern)
Main Supervisor:
Nielsen, Flemming (Intern)
Examiner:
Hillston, Jane (Ekstern)
Ingolfsdottir, Anna (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Maciej Krupa

Department of Mathematics
Period: 18/09/2003 → 31/12/2004
Number of participants: 1
Project participant:
Brøns, Morten (Intern)

Financing sources
Source: Gaver, Private danske Fonde
Name of research programme: Gaver, Private danske Fonde
Amount: 162,000.00 Danish Kroner
Project

Functional Data Analysis in Medical Signal Processing

Department of Informatics and Mathematical Modeling
Period: 15/09/2003 → 31/05/2007
Number of participants: 5
Phd Student:
Jacobsen, Danjal Jakup (Intern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Winther, Ole (Intern)
Nørgård, Peter Magnus (Intern)
Poline, Jean-Baptiste (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Modeller og metoder til analyse af decentral produktion på markedsvilkår

Department of Informatics and Mathematical Modeling
Period: 15/09/2003 → 02/07/2008
Number of participants: 5
Phd Student:
Schaumburg-Müller, Camilla (Intern)
Capacity Improvements in Cellular Systems
Department of Informatics and Mathematical Modeling
Period: 01/09/2003 → 03/09/2007
Number of participants: 6
PhD Student:
Christensen, Lars P.B. (Intern)
Supervisor:
Hejøen-Sørensen, Pedro (Intern)
Main Supervisor:
Larsen, Jan (Intern)
Examiner:
Winther, Ole (Intern)
Fleury, Bernard H. (Ekstern)
Hejøen-Sørensen, Pedro (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Eksternt finansieret virksomhed
Project: PhD

Dynamiske undersøgelser af flerlegemesystemer
Department of Informatics and Mathematical Modeling
Period: 01/09/2003 → 15/01/2007
Number of participants: 7
PhD Student:
Hoffmann, Mark (Intern)
Supervisor:
Sørensen, Mads Peter (Intern)
True, Hans (Intern)
Main Supervisor:
Thomsen, Per Grove (Intern)
Examiner:
Houbak, Niels (Intern)
Berg, Mats (Ekstern)
Hansen, John Michael (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-loennet stipendie
Project: PhD

Modeling of Animate Object Contours, Surfaces, Regions
Department of Informatics and Mathematical Modeling
Period: 01/10/2003 → 01/04/2004
Number of participants: 1
Project participant:
Høholdt, Tom (Intern)

Financing sources
Source: Gaver, Private danske Fonde
Name of research programme: Gaver, Private danske Fonde
Amount: 10,000.00 Danish Kroner
Project

Foundations of Cryptography and Security
Department of Mathematics
Period: 25/06/2003 → 01/10/2003
Number of participants: 1
Project participant:
Knudsen, Lars Ramkilde (Intern)

Financing sources
Source: Forskningsprojekter - Andre ministerier og styrelser
Name of research programme: Forskningsprojekter - Andre ministerier og styrelser
Amount: 216,756.00 Danish Kroner
Project

Dynamics in The Complex Plane
Department of Mathematics
Period: 20/06/2003 → 29/02/2004
Number of participants: 1
Project participant:
Bendsøe, Martin P. (Intern)

Financing sources
Source: Forskningsrådene - Andre
Name of research programme: Forskningsrådene - Andre
Amount: 20,400.00 Danish Kroner
Project
Financing sources
Source: Forskningsrådene - SNF
Name of research programme: Forskningsrådene - STVF
Amount: 397,970.00 Danish Kroner
Project

Computational Auditory Scene analysis for Hearing Aids
Department of Informatics and Mathematical Modeling
Period: 01/06/2003 → 20/11/2006
Number of participants: 6
Phd Student:
Pedersen, Michael Syskind (Intern)
Supervisor:
Kjems, Ulrik (Intern)
Main Supervisor:
Larsen, Jan (Intern)
Examiner:
Winther, Ole (Intern)
Moonen, Marc (Ekstern)
Oja, Erkki (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Ansat ekstert
Project: PhD

Deming Li
Department of Mathematics
Period: 20/05/2003 → 30/06/2004
Number of participants: 1
Project participant:
Thomassen, Carsten (Intern)

Financing sources
Source: Uddannelse. Private. Andre virksomheder
Name of research programme: Uddannelse. Private. Andre virksomheder
Amount: 34,650.00 Danish Kroner
Project

A Functional Analytic Approach to Forward and Inverse Electromagnetic Scattering Theory
Department of Mathematics
Period: 15/05/2003 → 31/01/2008
Number of participants: 5
Phd Student:
Karamehmedovic, Mirza (Intern)
Main Supervisor:
Pedersen, Michael (Intern)
Examiner:
Hansen, Vagn Lundsgaard (Intern)
Cornean, Horia (Ekstern)
Grubb, Gerd (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD
Probabilistic Networks: Diagnostic Decision Support Systems

Department of Informatics and Mathematical Modeling
Period: 15/05/2003 → 05/11/2007
Number of participants: 6
Phd Student:
Andersen, Morten Nonboe (Intern)
Supervisor:
Hansen, Lars Kai (Intern)
Main Supervisor:
Winther, Ole (Intern)
Examiner:
Nielsen, Bo Friis (Intern)
Gerds, Thomas Alexander (Ekstern)
Heskes, Tom (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

3D-pris

Department of Mathematics
Period: 09/05/2003 → 31/12/2004
Number of participants: 1
Project participant:
Scheufens, Ernst E (Intern)

Financing sources
Source: Uddannelse. Statslige. Andre statslige
Name of research programme: Uddannelse. Statslige. Andre statslige
Amount: 25,000.00 Danish Kroner
Project

Visualisering, opmåling & editering af 3D-medicinske data

Department of Informatics and Mathematical Modeling
Number of participants: 7
Phd Student:
Jakobsen, Bjarke (Ekstern)
Supervisor:
Madsen, Jan (Intern)
Pedersen, Steen (Intern)
Main Supervisor:
Christensen, Niels Jørgen (Intern)
Examiner:
Carstensen, Jens Michael (Intern)
Henriksen, Knud (Ekstern)
Sramek, Milos (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Programbevilling
Project: PhD

Disruption Management i transportsektoren

Department of Informatics and Mathematical Modeling
Period: 01/04/2003 → 01/07/2009
Number of participants: 6
Phd Student:
Wanscher, Jørgen (Intern)
Supervisor:
Larsen, Jesper (Intern)
Main Supervisor:
Clausen, Jens (Intern)
Examiner:
Stidsen, Thomas Jacob Riis (Intern)
Davidsson, Paul (Ekstern)
Liu, Ronghui (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering
Project: PhD

Stabiliserings-Algoritmer til Storskala-Problemer
Department of Informatics and Mathematical Modeling
Period: 01/04/2003 → 31/05/2006
Number of participants: 5
Phd Student:
Jensen, Toke Koldborg (Intern)
Main Supervisor:
Hansen, Per Christian (Intern)
Examiner:
Nielsen, Hans Bruun (Intern)
Fischer, Bernd (Ekstern)
Kilmer, Misha Elena (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Statisk program analyse af VHDL
Department of Informatics and Mathematical Modeling
Period: 01/04/2003 → 18/04/2007
Number of participants: 6
Phd Student:
Tolstrup, Terkel Kristian (Intern)
Supervisor:
Nielsen, Flemming (Intern)
Main Supervisor:
Nielsen, Hanne Riis (Intern)
Examiner:
Madsen, Jan (Intern)
Banerjee, Anindy (Ekstern)
Sabelfeld, Andrei (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Webmining: Finding Meaning in Distributed Signals on the Internet
Department of Informatics and Mathematical Modeling
Period: 01/04/2003 → 30/06/2006
Number of participants: 7
Phd Student:
Meng, Anders (Intern)
Supervisor:
Hansen, Lars Kai (Intern)
Rose, Michael (Intern)
Main Supervisor:
Larsen, Jan (Intern)
Examiner:
Winther, Ole (Intern)
Casey, Michael A. (Ekstern)
Riis, Søren Kamaric (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU, Samfinansiering
Project: PhD

Janos Barat
Department of Mathematics
Period: 10/03/2003 → 28/02/2005
Number of participants: 1
Project participant:
Thomassen, Carsten (Intern)

Financing sources
Source: Forsk. EU - Rammeprogram
Name of research programme: Forsk. EU - Rammeprogram
Amount: 1,023,804.00 Danish Kroner
Project

Klassifikation af naturligt forekommende lydmiljøer
Department of Informatics and Mathematical Modeling
Period: 01/02/2003 → 30/06/2006
Number of participants: 4
Phd Student:
Ahrendt, Peter (Intern)
Main Supervisor:
Larsen, Jan (Intern)
Examiner:
Winther, Ole (Intern)
Jensen, Søren Holdt (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Spatio-Temporal Analysis of Electro-Encephalography Data
Department of Informatics and Mathematical Modeling
Period: 01/02/2003 → 07/09/2006
Number of participants: 5
Phd Student:
Dyrholm, Mads (Intern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Larsen, Jan (Ekstern)
Anemüller, Jörn (Ekstern)
Jensen, Søren Holdt (Intern)

**Financing sources**
- Source: Internal funding (public)
- Name of research programme: Forskningsrådsfinansiering
- Project: PhD

### Universality and classification in holomorphic dynamics

- Department of Mathematics
- Period: 23/12/2002 → 31/12/2006
- Number of participants: 1
- Project Manager, organisational:
  - Henriksen, Christian (Intern)

**Financing sources**
- Source: Forskningsrådene - SNF
- Name of research programme: Forskningsrådene - STVF
- Amount: 1,634,020.00 Danish Kroner
- Project

### Computer Supported Drug Development

- Department of Informatics and Mathematical Modeling
- Period: 01/10/2002 → 20/10/2005
- Number of participants: 8
- Phd Student:
  - Tornøe, Christoffer Wenzel (Intern)
- Supervisor:
  - Agerøe, Henrik (Ekstern)
  - Jonsson, E. Niclas (Ekstern)
- Nielsen, Henrik Aalborg (Intern)
- Main Supervisor:
  - Madsen, Henrik (Intern)
- Examiner:
  - Rootzén, Helle (Intern)
  - Gabrielsson, Johan (Ekstern)
  - Vølund, Aage (Ekstern)

**Financing sources**
- Source: Internal funding (public)
- Name of research programme: Ansat eksternt
- Project: PhD

### Estimationsteori for stokastiske differential ligninger

- Department of Informatics and Mathematical Modeling
- Period: 01/10/2002 → 15/01/2007
- Number of participants: 6
- Phd Student:
  - Nolsøe, Kim (Intern)
- Supervisor:
  - Kessler, Mathieu (Ekstern)
- Main Supervisor:
  - Madsen, Henrik (Intern)
- Examiner:
  - Nielsen, Bo Friis (Intern)
  - Jørgensen, Bent (Intern)
Rydén, Tobias (Ekstern)

**Financing sources**  
*Source*: Internal funding (public)  
*Name of research programme*: DTU-lønned stipendie  
*Project*: PhD

**Chip Area Interconnection Networks**  
Department of Informatics and Mathematical Modeling  
*Period*: 01/09/2002 → 18/04/2006  
*Number of participants*: 6  
*Phd Student*: Mahadevan, Shankar (Intern)  
*Supervisor*: Madsen, Jan (Intern)  
*Main Supervisor*: Sparsø, Jens (Intern)  
*Examiner*: Hansen, Michael Reichhardt (Intern)  
Kuchcinski, Krzysztof (Ekstern)  
Wolf, Wayne Hendrix (Ekstern)  

**Financing sources**  
*Source*: Internal funding (public)  
*Name of research programme*: Anden EU-finansiering  
*Project*: PhD

**Diskrete tilnærmelser til kontinuerte frames**  
Department of Mathematics  
*Period*: 01/09/2002 → 31/05/2007  
*Number of participants*: 6  
*Phd Student*: Søndergaard, Peter Lempel (Intern)  
*Supervisor*: Hansen, Per Christian (Intern)  
*Main Supervisor*: Christensen, Ole (Intern)  
*Examiner*: Christiansen, Edmund (Ekstern)  
25_NN_Studenter/Øvrige medarb. (Ekstern)  
Feichtinger, Hans G. (Ekstern)  

**Financing sources**  
*Source*: Internal funding (public)  
*Name of research programme*: Forskningsrådsfinansiering  
*Project*: PhD

**Intra-Chip Communication**  
Department of Informatics and Mathematical Modeling  
*Period*: 01/09/2002 → 10/02/2006  
*Number of participants*: 5  
*Phd Student*: Bjerregaard, Tobias (Intern)  
*Main Supervisor*: Sparsø, Jens (Intern)  
*Examiner*: Nannarelli, Alberto (Intern)
Ginosar, Ran (Ekstern)
Goossens, Kees (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Near Earth Objects, Detection and Observation
Department of Mathematics
Period: 01/09/2002 → 02/01/2006
Number of participants: 6
Phd Student:
Wolff, Stefan (Intern)
Supervisor:
Jørgensen, Uffe Græ (Ekstern)
Main Supervisor:
Hjorth, Poul G. (Intern)
Examiner:
Jørgensen, John Leif (Intern)
Mignard, Francois (Ekstern)
Rasmussen, Kaare Lund (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Rekonfigurérbare optiske bølgelederstrukturer genereret ved solitonvekselvirkning
Department of Mathematics
Period: 01/09/2002 → 15/05/2006
Number of participants: 7
Phd Student:
Larsen, Peter Ulrik Vingaard (Intern)
Supervisor:
Bang, Ole (Intern)
Christiansen, Peter Leth (Intern)
Main Supervisor:
Sørensen, Mads Peter (Intern)
Examiner:
Hjorth, Poul G. (Intern)
Rasmussen, Jens Juul (Intern)
Wyller, John Andreas (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Web-mining: Finding meaning in distributed signals on the internet
Department of Informatics and Mathematical Modeling
Period: 01/09/2002 → 13/03/2006
Number of participants: 6
Phd Student:
Madsen, Rasmus Elsborg (Intern)
Supervisor:
Larsen, Jan (Intern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Winther, Ole (Intern)
Kaski, Samuel (Ekstern)
Svendsen, Michael Ø. (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Kohærent dynamik af exciterbare koblede beta celler
Department of Mathematics
Period: 01/07/2002 → 25/10/2006
Number of participants: 5
Phd Student:
Pedersen, Morten Gram (Intern)
Main Supervisor:
Sørensen, Mads Peter ( Intern)
Examiner:
Knudsen, Carsten ( Intern)
Galvanovskis, Juris (Ekstern)
Sturis, Jeppe (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Stokastisk dynamik i kompekse systemer
Department of Informatics and Mathematical Modeling
Period: 01/07/2002 → 25/10/2006
Number of participants: 7
Phd Student:
Overgaard, Rune Viig (Intern)
Supervisor:
Carlsson, Mats (Ekstern)
Knudsen, Carsten (Intern)
Main Supervisor:
Madsen, Henrik (Intern)
Examiner:
Nielsen, Henrik Aalborg (Intern)
Gabrielsson, Johan (Ekstern)
Vicini, Paolo (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Condition Monitoring and Management from Acoustic Emissions
Department of Informatics and Mathematical Modeling
Period: 01/06/2002 → 18/11/2005
Number of participants: 6
Phd Student:
Pontoppidan, Niels Henrik Bohl (Intern)
Tomographic Reconstruction using Anatomical Regularisation

Department of Informatics and Mathematical Modeling
Period: 01/06/2002 → 13/03/2006
Number of participants: 7
PhD Student:
Høgh-Rasmussen, Esben (Intern)
Supervisor:
Hansen, Per Christian (Intern)
Svarer, Claus (Ekstern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Larsen, Jan (Ekstern)
Andersen, Jens Damgaard (Ekstern)
Berry, Michael W. (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Anden EU-finansiering
Project: PhD

Mobile Location Services for next Generation Wireless Networks

Department of Informatics and Mathematical Modeling
Period: 01/05/2002 → 02/07/2008
Number of participants: 5
PhD Student:
Schou, Saowanee (Intern)
Supervisor:
Sørensen, Lene Tolstrup (Intern)
Main Supervisor:
Olesen, Henning (Intern)
Examiner:
Schultz, Nette (Intern)
Constantiou, Ioanna D. (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Ansat eksternt
Project: PhD

New approximation Methods for Non-linear Signal Processing Systems

Department of Informatics and Mathematical Modeling
Period: 01/05/2002 → 02/01/2006
Number of participants: 5
Phd Student:
Petersen, Kaare Brandt (Ekstern)
Supervisor:
Hansen, Lars Kai (Intern)
Main Supervisor:
Winther, Ole (Intern)
Examiner:
Söderberg, Bo (Ekstern)
Valpola, Harri (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Eksternt finansieret virksomhed
Project: PhD

Tools for Multi-Media Signal Processing the "binding" Problem

Department of Informatics and Mathematical Modeling
Period: 01/04/2002 → 20/10/2005
Number of participants: 6
Phd Student:
Lehn-Schiøler, Tue (Intern)
Supervisor:
Larsen, Jan (Intern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Winther, Ole (Intern)
Müller, Klaus-Robert (Ekstern)
Viberg, Mats (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Design af hierarkiske netværk

Department of Informatics and Mathematical Modeling
Period: 01/03/2002 → 05/08/2005
Number of participants: 5
Phd Student:
Thomadsen, Tommy (Intern)
Main Supervisor:
Clausen, Jens (Intern)
Examiner:
Hansen, Per Christian (Intern)
Boland, Natasha Lesley (Ekstern)
Zachariasen, Martin (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

System design for vision based dermatological measurement

Department of Informatics and Mathematical Modeling
Period: 01/03/2002 → 12/07/2005  
Number of participants: 6  
Phd Student:  
Gomez, David Delgado (Intern)  
Supervisor:  
Ersbøll, Bjarne Kjær (Intern)  
Main Supervisor:  
Carstensen, Jens Michael (Intern)  
Examiner:  
Larsen, Rasmus Werner (Intern)  
Johansen, Peter (Ekstern)  
Thodberg, Hans Henrik (Intern)  

Financing sources  
Source: Internal funding (public)  
Name of research programme: Programbevilling  
Project: PhD

Geodata-Infrastruktur  
Department of Informatics and Mathematical Modeling  
Period: 01/02/2002 → 01/08/2007  
Number of participants: 8  
Phd Student:  
Christensen, Jesper Vinther (Intern)  
Supervisor:  
Bjørner, Dines (Intern)  
Frederiksen, Poul (Intern)  
Jacobi, Ole Illum (Intern)  
Main Supervisor:  
Nilsson, Jørgen Fischer (Intern)  
Examiner:  
Villadsen, Jørgen (Intern)  
Andreasen, Troels (Ekstern)  
Östman, Anders (Ekstern)  

Financing sources  
Source: Internal funding (public)  
Name of research programme: Ansat eksternt  
Project: PhD

Optimal rydning af landminer og ammunition  
Department of Informatics and Mathematical Modeling  
Period: 01/02/2002 → 13/03/2006  
Number of participants: 6  
Phd Student:  
Vistisen, Jan Bastholm (Intern)  
Supervisor:  
Christensen, Torben (Ekstern)  
Main Supervisor:  
Clausen, Jens (Intern)  
Examiner:  
Larsen, Jan (Ekstern)  
Clausen, Svend (Ekstern)  
Haugstad, Bjarne (Ekstern)  

Financing sources  
Source: Internal funding (public)  
Name of research programme: Anden sektorministeriel finans  
Project: PhD
Topologisk Fluid Dynamik: Bifurkationer og strukturer i strømninger

Department of Mathematics
Period: 01/02/2002 → 02/01/2006
Number of participants: 6
Phd Student:
Bisgaard, Anders Villefrance (Intern)
Supervisor:
Sørensen, Jens Nørkær (Intern)
Main Supervisor:
Brøns, Morten (Intern)
Examiner:
Sørensen, Mads Peter (Intern)
Krupa, Maciej (Intern)
Ottesen, Johnny Tom (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Algebraisk Kodningsteori og Informationsteori

Department of Mathematics
Period: 03/01/2002 → 31/12/2004
Number of participants: 1
Project participant:
Høholdt, Tom (Intern)

Financing sources
Source: Forskningsrådene - SNF
Name of research programme: Forskningsrådene - STVF
Amount: 550,000.00 Danish Krone

Minimal Metric Skeletons

Metric graphs are considered as geometric background structures in their own right via an extension of the combinatorial Laplacian to the Friedrich extended Laplacian on the graphs which are considered as essentially one-dimesional submanifolds in the ambient space. The vertex minimality of these graphs guarantees not only selfadjointness of the Laplacian but also a direct comparison between functions in the ambient space and their restrictions to the graphs. This 'restriction comparison' is exploited in this project. Metric graphs may serve as good (Hausdorff-close) approximations to surfaces in 3-space. It is conjectured that minimal metric graphs (with straight line edges) in this sense can be used to approximate minimal surfaces modulo any given $\varepsilon > 0$.

Department of Mathematics
Period: 01/01/2002 → 01/01/2020
Number of participants: 1
Locally finite countable graphs, Laplacian comparison geometry, Minimal immersions
Project participant:
Markvorsen, Steen (Intern)

Financing sources
Source: [Ordinær drift UK 10]
Name of research programme: [Ordinær drift UK 10]
Amount: 10,000.00 Danish Krone

Modellering og analyse af globale applikationer

Department of Informatics and Mathematical Modeling
Period: 01/01/2002 → 12/07/2005
Number of participants: 6
Phd Student: Buchholtz, Mikael (Intern)
Supervisor: Nielson, Flemming (Intern)
Main Supervisor: Nielson, Hanne Riis (Intern)
Examiner: Haxthausen, Anne Elisabeth (Intern)
Focardi, Riccardo (Ekstern)
Guttman, Joshua D. (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Eksternt EU-finansieret
Project: PhD

Security Validation through Static Analysis
Department of Informatics and Mathematical Modeling
Period: 01/01/2002 → 06/06/2005
Number of participants: 5
Phd Student: Hansen, René Rydhof (Intern)
Main Supervisor: Nielson, Flemming (Intern)
Examiner: Fischer, Paul (Intern)
Cortesi, Agostino (Ekstern)
Schmidt, David A. (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Wavelet in Audio/Visual Electronic Systems
Department of Mathematics
Period: 05/11/2001 → 31/03/2006
Number of participants: 1
Project participant: Christensen, Ole (Intern)

Financing sources
Source: Forskningsrådene - STVF
Name of research programme: Forskningsrådene - STVF
Amount: 1,710,746.00 Danish Kroner
Project

Stokastisk model til beskrivelse af trafik dynamik i tidsperioder med stationær trafik
Department of Informatics and Mathematical Modeling
Period: 01/10/2001 → 22/08/2003
Number of participants: 3
Phd Student: Christensen, Thomas Kaare (Intern)
Supervisor: Iversen, Villy Bæk (Intern)
Main Supervisor:
On truncated Taylor series and the position of their spurious zeros
The title problem arises in the framework of linear and non-linear water waves where the accuracy of various truncated Taylor series solutions to Laplace's equation is important.

Department of Informatics and Mathematical Modeling
Period: 20/09/2001 → …
Number of participants: 2
Project participant:
Madsen, Per A. (Intern)
Project Manager, organisational:
Christiansen, Søren (Intern)

Antigiotika anvendelse og tidlig og rumlig spredning af antibiotikaresistens
Department of Informatics and Mathematical Modeling
Period: 15/08/2001 → 27/04/2005
Number of participants: 7
Phd Student:
Christiansen, Lasse Engbo (Intern)
Supervisor:
Andersen, Jens Strodl (Intern)
Wegener, Henrik Caspar (Intern)
Main Supervisor:
Madsen, Henrik (Intern)
Examiner:
Thyregod, Poul (Intern)
Agger, Jens (Ekstern)
Guttorp, Peter (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD
System design for vision-based dermatological measurements

Department of Informatics and Mathematical Modeling
Period: 07/08/2001 → 31/01/2002
Number of participants: 4
Phd Student:
Karras, Panagiotis (Intern)
Supervisor:
Ersbøll, Bjarne Kjær (Intern)
Larsen, Jan (Intern)
Main Supervisor:
Carstensen, Jens Michael (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsstipendium
Project: PhD

Geometrisk analyse af resolventer på mangfoldigheder med singulariteter

Department of Mathematics
Period: 01/08/2001 → 31/05/2005
Number of participants: 3
Phd Student:
Hansen, Lars (Ekstern)
Supervisor:
Grubb, Gerd (Ekstern)
Main Supervisor:
Pedersen, Michael (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Hig-Level Synthesis of Asynchronous

Department of Informatics and Mathematical Modeling
Period: 01/08/2001 → 06/06/2005
Number of participants: 6
Phd Student:
Nielsen, Sune Fallgaard (Intern)
Supervisor:
Madsen, Jan (Intern)
Main Supervisor:
Sparsø, Jens (Intern)
Examiner:
Nannarelli, Alberto (Intern)
Lavagno, Luciano (Ekstern)
Peeters, Ad (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Atsushi Kawamoto
Department of Mathematics
Period: 09/07/2001 → 31/08/2004
Number of participants: 1
Project participant:
Bendsøe, Martin P. (Intern)

Financing sources
Source: Forsk. Andre offentlige og private - Udenlandske
Name of research programme: Forsk. Andre offentlige og private - Udenlandske
Amount: 245,700.00 Danish Kroner

Mogens Oddershede Larsen
Department of Mathematics
Period: 13/06/2001 → 31/12/2002
Number of participants: 1
Project participant:
Larsen, Mogens Oddershede (Intern)

Financing sources
Source: Uddannelse. Statslige. Andre statslige
Name of research programme: Uddannelse. Statslige. Andre statslige
Amount: 25,000.00 Danish Kroner

Formanalyse af ørekanaler
Department of Informatics and Mathematical Modeling
Period: 01/06/2001 → 15/09/2004
Number of participants: 8
Phd Student:
Paulsen, Rasmus Reinhold (Intern)
Supervisor:
Conradsen, Knut (Intern)
Delingette, Hervé (Ekstern)
Laugesen, Søren (Intern)
Main Supervisor:
Larsen, Rasmus (Intern)
Examiner:
Carstensen, Jens Michael (Intern)
Cootes, Timothy F. (Ekstern)
Thodberg, Hans Henrik (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Erhvervsforskerordningen
Project: PhD

Bayesian Modelling for Multi-Agent control
Department of Informatics and Mathematical Modeling
Period: 01/04/2001 → 01/10/2004
Number of participants: 6
Phd Student:
Quinonero, Joaquin (Intern)
Supervisor:
Rasmussen, Carl Edward (Intern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Nielsen, Bo Friis (Intern)
Financing sources
Source: Internal funding (public)
Name of research programme: Eksternt EU-finansieret
Project: PhD

Development of Statistical Methods and Models for Evaluation and Determination of Environmental monitoring programs

Department of Informatics and Mathematical Modeling
Period: 01/04/2001 → 09/02/2005
Number of participants: 6
Phd Student:
Lophaven, Søren Nymand (Intern)
Supervisor:
Carstensen, Niels Jacob (Intern)
Main Supervisor:
Rootzén, Helle (Intern)
Examiner:
Nielsen, Allan Aasbjerg (Intern)
Grimvall, Anders (Ekstern)
Guttrop, Peter (Ekstern)

Financial sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Preben Alsholm undervisningspris

Department of Mathematics
Period: 30/03/2001 → 31/12/2001
Number of participants: 1
Project participant:
Alsholm, Preben Kjeld (Intern)

Financial sources
Source: Private funding (private)
Name of research programme: Uddannelse. Private. Fonde
Amount: 25,000.00 Danish Kroner
Project

Optimal foraging theory applied to simple models of patchy environments

Department of Informatics and Mathematical Modeling
Period: 15/03/2001 → 08/02/2007
Number of participants: 6
Phd Student:
Nilsson, Lars Anders Fredrik (Intern)
Supervisor:
Beyer, Jan (Intern)
Thygesen, Uffe Høgsbro (Intern)
Main Supervisor:
Nielsen, Bo Friis (Intern)
Examiner:
Rootzén, Helle (Intern)
Haccou, Patricia (Ekstern)

Financial sources
Source: Internal funding (public)
**Quest-projektet**

Department of Mathematics  
Period: 07/03/2001 → 31/12/2001  
Number of participants: 1  
Project participant:  
Mohr, Gunnar (Intern)

**Financing sources**  
Source: Forsk. Private danske - Andre  
Name of research programme: Forsk. Private danske - Andre  
Amount: 35,000.00 Danish Kroner

**Diskret matematik**

Department of Mathematics  
Period: 12/02/2001 → 30/09/2004  
Number of participants: 1  
Project participant:  
Thomassen, Carsten (Intern)

**Financing sources**  
Source: Forskningsrådene - SNF  
Name of research programme: Forskningsrådene - STVF  
Amount: 1,080,000.00 Danish Kroner

**Design og Anvendelse af en byggeontologi - Design and Application of a civil engineering Ontology**

Department of Informatics and Mathematical Modeling  
Period: 01/02/2001 → 05/07/2004  
Number of participants: 6  
Phd Student:  
Eir, Asger (Intern)  
Supervisor:  
Galle, Per (Intern)  
Main Supervisor:  
Bjørner, Dines (Intern)  
Examiner:  
Hansen, Bo Stig (Intern)  
Pedersen, Stig Andur (Intern)  
Turk, Ziga (Ekstern)

**Financing sources**  
Source: Internal funding (public)  
Name of research programme: DTU-lønnnet stipendie  
Project: PhD

**Nonlinear Photonic Crystals**

Department of Informatics and Mathematical Modeling  
Period: 01/02/2001 → 18/08/2004  
Number of participants: 8  
Phd Student:  
Nikolov, Nikola Ivanov (Intern)  
Supervisor:  
Bang, Ole (Intern)
Minimizing antibiotic resistance development MINIRESIST
The overall objective is to minimize resistance development in the intestinal flora of pigs following antibiotic treatment. The project has the following specific objectives: - To investigate the influence of antibiotic treatment regimes on the efficacy of treatment, the development and spread of resistant bacteria and on the load of resistant bacteria in the intestine at the point of slaughter. - To investigate the underlying kinetics of selection of resistant bacteria and the spread of resistance genes between bacteria in the intestine. - To investigate the association between the load of resistant bacteria in the intestine at the time of slaughter and the load on the carcasses after slaughter. - To develop and validate a comprehensive mathematical model for resistance development associated with the use of antibiotics in pig production. - To formulate improved treatment regimes using the mathematical model.

Division of Veterinary Diagnostics and Research
National Veterinary Institute
Department of Informatics and Mathematical Modeling
University of Copenhagen
Danish Agriculture and Food Council
University of Glasgow
Institute of Farm Animal Genetics
Period: 11/01/2001 → 14/12/2013
Number of participants: 13
Acronym: MINIRESIST
Project ID: 22481
Project participant:
Hansen, Axel Jacob Kornerup (Ekstern)
Guardabassi, Luca (Ekstern)
Nielsen, Jens Peter (Ekstern)
Nielsen, Søren Saxmose (Ekstern)
Toft, Nils (Ekstern)
Angen, Øystein (Intern)
Madsen, Henrik (Intern)
Christiansen, Lasse Engbo (Intern)
Bækbo, Poul (Ekstern)
Andreasen, Margit (Ekstern)
Matthews, Louise (Ekstern)
Schwarz, Stefan (Ekstern)
Project Manager, organisational:
Olsen, John Elmerdahl (Ekstern)

Financing sources
Source: Forskningsprojekter - Andre ministerier og styrelser
Name of research programme: Forskningsprojekter - Andre ministerier og styrelser
Amount: 3,726,720.00 Danish Kroner
Project

MACSI-net
Department of Mathematics
Period: 04/01/2001 → 30/04/2004
Number of participants: 1
Project participant:
Gravesen, Jens (Intern)

Financing sources
Source: Forsk. EU - Rammeprogram
Name of research programme: Forsk. EU - Rammeprogram
Amount: 159,840.00 Danish Kroner
Project

Statistical Image Segmentation in 3D and 4D
Department of Informatics and Mathematical Modeling
Period: 01/01/2001 → 04/06/2004
Number of participants: 6
Phd Student:
Stegmann, Mikkel Bille (Intern)
Supervisor:
Larsen, Rasmus (Intern)
Larsson, Henrik B.W. (Ekstern)
Main Supervisor:
Ersbøll, Bjarne Jørgen (Ekstern)
Examiner:
Hansen, Lars Kai (Intern)
Sonka, Milan (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering
Project: PhD

Scientific Computing in Optimization, Simulation and Inversion
The goal of this research collaboration is to strengthen our research in scientific computing and algorithm development with emphasis on nonlinear and combinatorial optimization, simulation, and inversion. Among the most promising algorithms today are those based on various splitting techniques for subdivision of the problem as well as the algorithm, and there is a significant overlap between the splitting techniques currently in use within the above areas. In this project we will coordinate the algorithm development within our specific research areas and thus be able to draw collectively upon
progress in the individual areas. The focus of our research will lie on the following areas: 1) new splitting techniques for branch-and-bound algorithms in optimization, 2) space-mapping techniques for complex optimization problems, 3) application of domain decomposition and approximation theory in simulation algorithms, 4) preconditioning techniques (based on domain decomposition and multilevel algorithms) for inversion algorithms, 5) methods for including prior knowledge/side constraints in linear and nonlinear inversion algorithms.

Department of Informatics and Mathematical Modeling

University of Copenhagen
Period: 01/12/2000 → 31/12/2002
Number of participants: 5
Project participant:
Hansen, Per Christian (Ekstern)
Madsen, Kaj (Ekstern)
Clausen, Jens (Ekstern)
Skelboe, Stig (Ekstern)

Project Security and Safety of Computer Systems

Static analysis is a proven technology in the implementation of compilers and interpreters. Recent years have begun to see the application of static analysis techniques in novel areas such as software validation (for example, Ariane V) and software re-engineering (for example, the Y2K problem). This project will demonstrate that static analysis facilitates the validation of the security and safety of internet based computer systems.

Department of Informatics and Mathematical Modeling
Imperial College of Science, Technology and Medicine
French National Institute for Computer Science and Applied Mathematics
Trusted Logic
Period: 01/12/2000 → 31/12/2002
Number of participants: 5
Project participant:
Nielsen, Hanne Riis (Intern)
Hankin, Chris (Ekstern)
Jensen, Thomas (Ekstern)
Marlet, Renaud (Ekstern)

Project Statistical modelling of Traffic safety development

ph.d. project financed by the Danish Transport Research Institute (DTF). The purpose of the project is to discuss various statistical models for assessing traffic safety development at an aggregate (national) level, exemplified by a study of the possible influence of various socioeconomic variables on traffic safety in Denmark.

Department of Informatics and Mathematical Modeling
Danish Transport Research Institute
Period: 01/12/2000 → 31/12/2003
Number of participants: 3
Project participant:
Christens, Peter (Intern)

Project Center for Interdisciplinary Studies

The purpose is to create a virtual center to enhance interdisciplinary studies, workshops, and conferences related to technological issues.
DESCARTES - Decision Support for Integrated Crew and Aircraft Recovery
DESCARTES addresses the problem of disruption management for large airlines. This is considered one of the most important and hardest problems to deal with in today's planning procedures in the airline industry. The goal of the project has been to develop a prototype tool enabling the airlines to integrate the management of aircrafts and staff when replanning immediately before a flight due to last minute changes. The project has progressed in an incremental fashion developing a number of individual recovery systems for aircraft, crew, and passengers as well as a system enabling these to collaborate when generation potential solutions for a disruption. Each of the individual systems are useful as a stand-alone system enabling the project to give early business benefit to the industrial partner and to the software vendor participating. A number of different approaches has been tested in the development process: heuristics, constraint programming, and traditional mathematical programming methods. Also, different approaches to solution techniques for the integration of recovery systems has been tested: the Integrated Sequential Recovery method consisting of the individual subsystems collaboration through a well-defined interface to retrieve options, and the Tailored Integration approach, in which the generation of potential solutions is influenced by the current situation for crew and aircraft concurrently. The results of the project now form the basis of a number of commercial products marketed by Carmen System AB.

Department of Informatics and Mathematical Modeling

British Airways
Carmen System A.B.
Period: 01/11/2000 → 31/12/2002
Number of participants: 8
Project participant:
Madsen, Oli B.G. (Intern)
Saxtorph, Jesper (Intern)
Hultberg, Tim Helge (Intern)
Larsen, A (Ekstern)
Larsen, J. (Ekstern)
Project Manager, organisational:
Clausen, Jens (Intern)
Bundock, Nicki (Ekstern)
Tiourine, Sergey (Ekstern)

Location models
Traditional continuous location models attempt to locate point facilities in two-dimensional space so as to minimize transportation costs. In this project we expand the focus and try to locate lines in three-dimensional space or circles on the surface of a sphere. The research results are presented at conferences.

Department of Informatics and Mathematical Modeling
University of Kaiserslautern
Royal Military College of Canada
Period: 01/11/2000 → …
Number of participants: 3
Signal Processing in Humanitarian Demining
The aim is to investigate the possibilities for multisensor based system for detection and classification of burried landmines. The main focus is on signal and image processing techiques for improvement of Ground Penetrating Radar detection system

Department of Informatics and Mathematical Modeling
Biomedical Engineering
Department of Electrical Engineering

Ultra short nonlinear optical pulse propagation
The nonlinear Schrödinger equation (NLS) describes approximately the dynamics of optical pulse envelopes in the limit of many oscillations in the carrier wave. In ultra short optical pulses of order 10 femtoseconds, the number of oscillations is so few that the validity of the NLS equation is highly questionable. In this case it is necessary to study the original vector Maxwell equations including nonlinearity and polarization dynamics. So far investigations have shown that extending the NLS equation using higher order dispersion and nonlinearities and comparing to Maxwells equations describes well even ultra short pulses within the slowly varying envelope approximation. However, in a number of cases also the extended NLS equation cannot be used. As the magnitude of the dispersion and nonlinearity depends on the wave number/frequency, waves with different wave numbers obey different NLS equations. Accordingly, interaction among ultra short pulses of different wave numbers can only be treated using the original Maxwell's equations. Blow up observed in quintic NLS equations may be arrested when investigated in the framework of these original equations. Interference phenomena and propagation in optical crystals of ultra short pulses is better modelled by employing the Maxwell's equations. The purpose of this project is to go beyond the limit of the NLS equation and its extensions in studies of ultra short nonlinear optical pulses by invoking the first principle vector Maxwells equations coupled nonlinearly to the Lorentz equations for the polarization dynamics.

Department of Informatics and Mathematical Modeling

Data assimilation in atmospheric dispersion of radioactive material
Department of Informatics and Mathematical Modeling
Mapping Visual Cortical Regions in Awake, Behaving Monkey using Functional MRI (MAPAWAMO)

Most of our understanding of the human visual system comes from comparison with experimental data, especially single-cell data, obtained in monkeys. The problem has been that one has to compare results obtained not only in different species but also with different techniques. A considerable advance could be made if one could compare the functional imaging results in human to those obtained with the same technique in monkeys and then in a second step compare within the same species functional imaging data with single-cell or other experimental data. To that end one needs functional magnetic resonance imaging (fMRI) in the awake, behaving monkey. The overall aim is to perfect the monkey
fMRI technique already in place in order to compare different types of fMRI analysis with an existing metabolic mapping standard in the monkey and to compare directly cortical networks in human and non-human primates. We will use fMRI to map visual cortical regions responsive to different types of visual stimuli and active in visual discrimination tasks in monkeys and in humans. We will within the same monkey subject compare activation maps measured with fMRI and those obtained by metabolic labeling (double label 2-deoxyglucose - 2DG). This latter data will serve as “ground truth” with which to compare the results of the different analysis techniques for the fMRI signals. We will also use ICA to develop new tools to estimate functional connectivity and compare this to the extensive anatomical knowledge available in the monkey.

Department of Informatics and Mathematical Modeling
Medical School
R.U. Neurophysiology

French National Institute for Computer Science and Applied Mathematics
Period: 01/09/2000 → 31/08/2003
Number of participants: 3
Project participant:
Nielsen, Finn Årup (Intern)
Dyrholm, Mads (Intern)
Project Manager, organisational:
Hansen, Lars Kai (Intern)

Project

Anvendelser af harmoniske afbildninger i geometriske variationsproblemer

Department of Mathematics
Period: 01/08/2000 → 01/11/2004
Number of participants: 2
Phd Student:
Ammitzbøll, Jeppe (Intern)
Main Supervisor:
Hansen, Vagn Lundsgaard (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Secure and Safe Systems based on Static Analysis
Static analysis of programs is a proven technology in the implementation of compilers and interpreters. Recent years have begun to see application of static analysis techniques in novel areas such as software validation and software re-engineering. This project will demonstrate that static analysis technology facilitates the validation of systems based on the internet and on smart cards.

Department of Informatics and Mathematical Modeling
Period: 01/08/2000 → 01/10/2003
Number of participants: 2
Project participant:
Nielsen, Hanne Riis (Intern)
Project Manager, organisational:
Nielsen, Flemming (Intern)
Project

Sprog og logikker for ontologier

Department of Informatics and Mathematical Modeling
Period: 01/08/2000 → 16/02/2004
Number of participants: 6
Phd Student:
Oldager, Steen Nikolaj (Intern)
Supervisor:
Bruun, Hans (Intern)
Main Supervisor:
Nilsson, Jørgen Fischer (Intern)

Examiner:
Hansen, Michael Reichhardt (Intern)
Gehrke, Mai (Ekstern)
Øhrstrøm, Peter (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Håndtering af Risiko borbundet med investeringer i et liberaliseret El-marked

Department of Informatics and Mathematical Modeling
Period: 15/07/2000 → 11/02/2005
Number of participants: 7
Phd Student:
Lemming, Jacob (Intern)

Supervisor:
Morthorst, Poul Erik (Intern)
Ravn, Hans V. (Intern)

Main Supervisor:
Clausen, Jens (Intern)

Examiner:
Larsen, Jesper (Ekstern)
Bunn, Derek (Ekstern)
Wallace, Stein William (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Risø (Løn)
Project: PhD

3D/4D image analysis

Department of Informatics and Mathematical Modeling
Period: 01/07/2000 → 11/12/2003
Number of participants: 5
Phd Student:
Aanæs, Henrik (Intern)

Main Supervisor:
Larsen, Rasmus (Intern)

Examiner:
Ersbøll, Bjarne Kjær (Intern)
Pollefeys, Marc (Ekstern)
Zhu, Song-Chun (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

BIPS - None Touchable Inspections of Industrial Processes and Systems

Traditional ultrasound inspections require physical contact between the piezo-electric sound generator and the product or item to be investigated. Good contact is achieved by smearing oil onto the item which provides a good impedance match. In many potential new applications of ultrasound, physical contact is not desirable between the ultrasound generator/detector and the item to be inspected. This is the case in inspection at assembly lines, where the high speed of production do not allow cumbersome smearing and placement of an ultrasound generator/receiver onto the products on the line. However, in this project non contact ultrasound inspections are suggested to be accomplished using lasers. A powerful laser pulse is directed onto an item which generates a sound wave propagating through the item and is reflected from possible hidden defects. On return to the surface the wave is detected by laser beams who's interference patterns
register the movement of the surface. The physical laser system is developed at Risø and FORCE Institute. The contribution to this project from IMM concerns mathematical modelling as an add to design and optimize a non touchable inspection system. This include modelling the generation of ultra sound through rapid laser heating from short pulses and wave propagation. Feedback control and steering of a production line with a non touchable inspection system implemented will be modelled and theoretically investigated.

Department of Informatics and Mathematical Modeling

FORCE Institutet

Risø National Laboratory

Junckers Industrier A/S

Banestyrelsen A/S

Coloplast Danmark A/S

Hamel Maskinfabrik, SciTech a/s

Period: 01/07/2000 → 31/12/2003

Number of participants: 5

Poulsen, Niels Kjølstad (Intern)

Halkjær, Søren (Intern)

Sevel, Torben (Ekstern)

Lynov, Jens-Peter (Intern)

Project Manager, organisational:

Sørensen, Mads Peter (Intern)

Datamining in distributed medial databases

Department of Informatics and Mathematical Modeling

Period: 01/07/2000 → 16/02/2004

Number of participants: 6

Phd Student:

Have, Anna Szynkowiak (Intern)

Supervisor:

Hansen, Lars Kai (Intern)

Main Supervisor:

Larsen, Jan (Intern)

Examiner:

Winther, Ole (Intern)

Hulle, Marc Van (Ekstern)

Svarer, Claus (Ekstern)

Financing sources

Source: Internal funding (public)

Name of research programme: Ansat eksternt CAMP

Limes

Department of Mathematics

Period: 21/06/2000 → 31/03/2004

Number of participants: 1

Project participant:

Branner, Bodil (Intern)

Financing sources

Source: Forsk. EU - Rammeprogram

Name of research programme: Forsk. EU - Rammeprogram

Amount: 586,751.00 Danish Kroner

Project
Image analysis in predictive biotechnology
Department of Informatics and Mathematical Modeling
Period: 01/06/2000 → 26/02/2004
Number of participants: 6
Phd Student:
Hansen, Michael Adsetts Edberg (Intern)
Supervisor:
Frisvad, Jens Christian (Intern)
Main Supervisor:
Carstensen, Jens Michael (Intern)
Examiner:
Nielsen, Jens (Intern)
Esbensen, Kim H. (Ekstern)
Petrou, Maria (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering
Project: PhD

Models for forecasting the number of passengers on OD level
This project is performed in close collaboration with Scandinavian Airlines System (SAS), with the purpose of improving SAS system for passenger forecasting on Origin - Destination (OD) level.

Department of Informatics and Mathematical Modeling
SAS
Period: 01/06/2000 → 30/06/2001
Number of participants: 2
Project participant:
Pedersen, Søren (Ekstern)
Project Manager, organisational:
Nielsen, Henrik Aalborg (Intern)
Nielsen, Henrik Aalborg (Intern)

1-bit audio encoding schemes for digital amplification of audio signals
Department of Informatics and Mathematical Modeling
Period: 01/04/2000 → 01/04/2001
Number of participants: 2
Phd Student:
Hansen, Thomas Karsten (Intern)
Main Supervisor:
Sørensen, John Aasted (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Erhvervsforskerordningen
Project: PhD

AMORE

Department of Information Technology
Department of Informatics and Mathematical Modeling
University of Rome
University of Konstanz
University of Patras
Swiss Federal Institute of Technology
University of L’Aquila
Centrum Wiskunde & Informatica
Period: 01/04/2000 → 31/03/2003
Number of participants: 1
Project Manager, organisational: Bjørner, Dines (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 1,100,000.00 Danish Kroner
Project

Data assimilering og autokalibrering i 2D/3D hydrodynamisk numerisk modellering af det marine miljø
Department of Informatics and Mathematical Modeling
Period: 01/04/2000 → 17/05/2004
Number of participants: 6
Phd Student:
Sørensen, Jacob Viborg Tornfeldt (Intern)
Supervisor:
Madsen, Henrik (Intern)
Main Supervisor:
Madsen, Henrik (Intern)
Examiner:
Poulsen, Niels Kjølstad (Intern)
Cañizares, Rafael (Ekstern)
Heemink, Arnold Willem (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Erhvervsforskerordningen
Project: PhD

Proof support for raise
Department of Informatics and Mathematical Modeling
Period: 01/04/2000 → 25/05/2004
Number of participants: 6
Phd Student:
Lindegaard, Morten Peter (Intern)
Supervisor:
Hansen, Michael Reichhardt (Intern)
Main Supervisor:
Haxthausen, Anne Elisabeth (Intern)
Examiner:
Sharp, Robin (Intern)
Janowski, Tomasz (Ekstern)
Krieg-Brückner, Bernd (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD
Length of general subdivision curves
Subdivision curves has recently become popular objects of studies and in this project we search for fast algorithms to evaluate the length of these curves.

Department of Mathematics
University of Stellenbosch
Period: 28/03/2000 → ...
Number of participants: 3
Project participant:
Villiers, Johan de (Ekstern)
Goosen, Karin (Ekstern)
Project Manager, organisational:
Gravesen, Jens (Intern)

Naural networks for data editing and imputation
Department of Informatics and Mathematical Modeling
Period: 01/03/2000 → 05/12/2001
Number of participants: 2
Phd Student:
Larsen, Bjørn Steen (Intern)
Main Supervisor:
Hansen, Lars Kai (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Offentlig finansiering
Project: PhD

Ikke-lineær optimering ved anvendelse af surrogatmodeller
Department of Informatics and Mathematical Modeling
Period: 01/02/2000 → 20/05/2003
Number of participants: 7
Phd Student:
Søndergaard, Jacob (Intern)
Supervisor:
Frandsen, Poul Erik (Ekstern)
Nielsen, Hans Bruun (Intern)
Main Supervisor:
Madsen, Kaj (Intern)
Examiner:
Hansen, Per Christian (Intern)
Ravn, Hans V. (Intern)
Vicente, Luis Nunes (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Nonlinear dynamics of optical polymers
Department of Informatics and Mathematical Modeling
Period: 01/02/2000 → 22/05/2003
Number of participants: 7
Phd Student:
Jespersen, Kim Giessmann (Intern)
Supervisor:
Johansen, Per Michael (Intern)
Novelty detection in video and image signals

Department of Informatics and Mathematical Modeling
Period: 01/02/2000 → 26/09/2003
Number of participants: 6
Phd Student: Maletti, Gabriela Mariel (Intern)

Supervisor: Conradsen, Knut (Intern)
Main Supervisor: Ersbøll, Bjarne Kjær (Intern)
Examiner: Larsen, Rasmus Werner (Intern)
Johansen, Peter (Ekstern)
Sonka, Milan (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU, Samfinansiering
Project: PhD

Wavelet and multiscale finite-element approximations

Department of Mathematics
Period: 01/02/2000 → 02/12/2003
Number of participants: 6
Phd Student: Jensen, Torben Klint (Intern)

Supervisor: Pedersen, Michael (Intern)
Main Supervisor: Christensen, Ole (Intern)
Examiner: Sørensen, Mads Peter (Intern)
Cohen, Albert (Ekstern)
Villemoes, Lars (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering
Project: PhD

3D Shape Analysis of The Craniofacial Anomaly in Children With Cleft Lip and Palate

This project develops methods for extraction and analysis of the shape and size of the human skull in infancy and adolescence, and is carried out at the joint 3D-Laboratory (3D-Lab) of Copenhagen University Hospital, School of Dentistry, University of Copenhagen and Informatics and Mathematical Modelling, Technical University of Denmark. The methods are applied to three-projection x-ray images, plaster casts of palatal impressions and three-dimensional scans of children with cleft lip and palate. Reliable and detailed (semi-) automatic 3D point-to-point correspondence across a
population of shapes is achieved using deformable models. Statistical methods are applied in order to analyze the shape and size variation within groups of children, as well as in order to discern between different types of treatment and study temporal evolution.

Department of Informatics and Mathematical Modeling

School of Dentistry
Period: 01/01/2000 → 31/12/2003
Number of participants: 4
Project participant:
Ersbøll, Bjarne Kjær (Intern)
Darvann, Tron (Ekstern)
Project Manager, organisational:
Larsen, Rasmus (Intern)
Kreiborg, Sven (Ekstern)

Bayesiansk signalbehandling og detektion

Department of Informatics and Mathematical Modeling
Period: 01/01/2000 → 25/09/2003
Number of participants: 7
Phd Student:
Fabricius, Thomas (Intern)
Supervisor:
Nørklit, Ole (Ekstern)
Rasmussen, Carl Edward (Intern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Larsen, Jan (Ekstern)
Fleury, Bernard H. (Ekstern)
Rasmussen, Lars Kldehøj (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnen stipendie
Project: PhD

Biomolecular Motor Mechanisms modelled by ratchets and solitons

Department of Informatics and Mathematical Modeling
Period: 01/01/2000 → 31/12/2002
Number of participants: 8
Project participant:
Nordén, Bengt (Ekstern)
Zolotaryuk, Y. (Ekstern)
Zolotaryuk, A. V. (Ekstern)
Ermakov, V. N. (Ekstern)
Kahlac, J. M. (Ekstern)
Savin, A. V. (Ekstern)
Project Manager, organisational:
Christiansen, Peter Leth (Intern)
Karpan, V. M. (Ekstern)

Center for VandKvalitetssensorer
Center for VandKvalitetssensorer - VAKS - er et samarbejde mellem 3 GTS-institutter (DHI, DELTA og Teknologisk Institut), 4 virksomheder (Danfoss Analytical, Unisense, Mikrolab Aarhus og Århus Kommunale Værker) samt 3 universitetsinstitutter (Aarhus Universitet, Afd. for Mikrobiel økologi, Syddansk Universitet - Odense, Biokemisk og Danmarks Tekniske Universitet, Institut for Matematisk Modellering (IMM)). Med VAKS skal skabes et nationalt center for

Department of Informatics and Mathematical Modeling

DHI Denmark

Period: 01/01/2000 → 30/06/2003

Number of participants: 2

Project participant: Lynggaard-Jensen, Anders (Ekstern)

Project Manager, organisational: Nielsen, Henrik Aalborg (Intern)

Project CIAMM - Center for Industrialised Application of Mathematical Modelling

CIAMM started its activity in late 1999. The goal has been to develop planning tools based on mathematical modelling, which can be used in everyday planning and replanning in larger companies. The planning problems are usually so complex, that a human planner cannot take into account all possible solutions. During the three project years the main case study has been the steel plate storage at Odense Steel Shipyard. The storage consist of 250 stacks containing more than 3000 types of steel plates. The plates are lifted by two gantry cranes sharing tracks and hence unable to pass each other. When a specific plate is needed in the production, all plates above this in the stack has to be moved to get access to the plate. Hence each plate is lifted unproductively a number of times before it is actually removed from the storage. The problem addressed is how to organize the storage in order to minimize the number of superfluous lifts. The project has developed methods both for planning the daily sequences of lifts and for on-line dispatch strategy for operating the cranes. Saving of 50 - 60 % on the current practice has been achieved. In addition, a packing system has been developed based on a real-life case from Bang & Olufsen, in which boxed are packed into containers taking into account also constraints regarding loads on the items and support of these. Finally, a methodology for IT-system development with a large optimization content has been developed and described - the technique resembles the DSDM method, and much attention is given to rapid prototype developments and to knowledge exchange between end users and developers, since this has turned out to be a major obstacle in the development process.

Department of Informatics and Mathematical Modeling

Department of Management Engineering

Aalborg University

Copenhagen Business School

Odense Steel Shipyard Ltd.

Bang & Olufsen A/S

Teknologisk Institut

Period: 01/01/2000 → 31/12/2002

Number of participants: 8

Project participant: Hansen, Jesper (Intern)

Project Manager, organisational: Clausen, Jens (Intern)

Vesterager, Johan (Intern)

Holm, Hans (Ekstern)

Mouritsen, Jan (Ekstern)

Tuxen, Jan (Ekstern)

Kamp, Per (Ekstern)
Coupled excitable cells
Mathematical modelling and theoretical investigations of pancreatic beta-cells, which are responsible for producing and secreting insulin. Pancreatic beta-cells belong to a class of cells that exhibit electrical activity like nerve cells and cells in muscle tissue. The dynamical behaviour results from an action potential across the cell membrane created by ion currents passing into and out of the cell. In the case of beta-cells the current flow is dominated by Ca- and K-ions, and both flows depend on the glucose concentration. Therefore the activity of the beta-cells is correlated to the production of insulin, which is a hormone essential for regulating the level of glucose in the blood. In the pancreas, beta-cells form islets of coupled cells, suggesting a study of cooperative behaviour in a spatially extended system that mimics the islets. Since dynamic pattern formation has been observed in spatially extended excitable media consisting of nervous tissue and heart muscle, we expect similar behaviour in the beta-cell islets.

Domain-specific Languages for Railway Control Systems
The purpose of this project is to develop a concept for development of railway control systems. The idea is to provide a generic railway control system, a domain-specific language for specifying application specific parameters and a compiler from domain-specific descriptions into configuration data for the generic control system. A validation, verification and test approach is also to be provided.

EDU-IT: 2000-2002
Brugen af IKT-værktøjer i undervisningen på DTU er gennemgået, best practices identificeret, og et antal forsøg med nye undervisningsformer og –materialer er gennemført. Af særlig interesse er mulighederne for eget VIP-TAP-samarbejde og udnyttelse af DTUs CSCW-system, CampusNet. EDU-IT videreføres i form af IMMs aktive deltagelse i SCKKs “Kompetencerejse”
the aim of preparing students to apply recent advances in Nonlinear Science to outstanding problems of science and technology and to strengthen international exchange of Ph.D. students. Over the past three decades, science has experienced a revolutionary shift in its fundamental paradigms. Primarily based on linear models through the 1960s, scientific research is now commonly motivated by nonlinear concepts, in which the whole is more than the sum of its parts, and the emergence of qualitatively new phenomena is anticipated and made welcome. The basic theme of modern Nonlinear Science is the interplay between chaos and coherent structures. Formerly deemed unworthy of the attention of a serious scientist, low order systems of nonlinear ordinary differential equations are now known to exhibit explosive behavior, leading to the emergence of strange attractors upon which phase space trajectories wander aimlessly until the end of time. Largely ignored as being far too difficult to solve analytically, nonlinear partial differential equations have been found to generate the emergence of solitary waves, which interact as new dynamic entities at higher levels of description. These new paradigms lead to significant advances in our understanding of a number of observed phenomena in physics, chemistry, and biology. From the theory, methods for constructive applications in the engineering sciences have been developed, using computer technology.

Department of Informatics and Mathematical Modeling

Department of Physics
Period: 01/01/2000 → 01/01/2002
Number of participants: 2
Project participant:
Bohr, Tomas (Intern)

Project Manager, organisational:
Christiansen, Peter Leth (Intern)

Industrialiseret anvendelse af matematiske optimeringsmodeller

Department of Informatics and Mathematical Modeling
Period: 01/01/2000 → 06/10/2003
Number of participants: 4
Phd Student:
Hansen, Jesper (Intern)
Main Supervisor:
Clausen, Jens (Intern)
Examiner:
Juel, Henrik (Intern)
Labbé, Martine (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Ansat eksternt CAMP
Project: PhD

Localisation by Nonlinearity and Spatial Discreteness, and Energy Transfer, in Crystals, Biomolecules and Josephson Arrays (LOCNET)

We will apply the concept of "Discrete breather" and recently gained insight into related types of localised excitation, to a wide range of physical and biological contexts. These will include dynamical function of DNA and molecular motors, spectral hole burning, interstellar carbon, high temperature superconductivity, light-emitting polymers, Josephson junction arrays, solid friction, nonlinear conductivity of charge density wawe materials, detonation and dynamics of hydrogen bonded systems. This will be achieved via deep two or more way interaction between theorists and experimentalists. It will involve further development of mathematical theory, physical insight, computational techniques, methods of interpretation of experimantal data and new experimental tests.

Department of Informatics and Mathematical Modeling
Period: 01/01/2000 → 31/12/2002
Number of participants: 8
Project participant:
MacKay, R. S. (Ekstern)
Aubry, S. (Ekstern)
Ustinov, A. V. (Ekstern)
Floria, L. M. (Ekstern)
Tsironis, G. P. (Ekstern)
Livi, R. (Ekstern)
**Fillaux, F. (Ekstern)**
Project Manager, organisational:
Christiansen, Peter Leth (Intern)

**Financing sources**
Source: Unknown
Name of research programme: Ukendt
Amount: 296,932.00 Danish Kroner
Project

**Marie Curie Training site**
Ph. D. courses and research training through participation in projects and courses on: coherent structures and vortex dynamics, wawe patterns, turbulence and chaos, nonlinear optics, lattices, superconduction, nanoelectronics, biomolecular dynamics, phsysiological control

CICT

Department of Informatics and Mathematical Modeling
Biophysics and Fluids
Department of Physics
University of Copenhagen
Novo Nordisk A/S

RISØ
Period: 01/01/2000 → 31/12/2002
Number of participants: 8
Project participant:
Scott, Alwyn C. (Intern)
Mosekilde, Erik (Intern)
Høgh Hansen, M. (Ekstern)
Colding-Jørgensen, M. (Ekstern)
Johansen, P. M. (Ekstern)
Rasmussen, J. Juul (Ekstern)
Graae Sørensen, P. (Ekstern)

Project Manager, organisational:
Christiansen, Peter Leth (Intern)

**Modellering, ikke-lineær Dynamik og irreversibel termodynamik (MIDIT)**


Department of Informatics and Mathematical Modeling
Department of Mathematics
Department of Physics
Administration

Department of Chemistry

Department of Energy Engineering
Period: 01/01/2000 → 31/12/2002
Number of participants: 1
Project Manager, organisational: Christiansen, Peter Leth (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 360,000.00 Danish Kroner

Multivariate Statistics in Predictive Biotechnology
The aims of the studies are based on the main hypothesis that the combination of multivariate statistics and image analysis of features can be used as a tool in (visual and chemical) database identification processes within isolates from the fungal genera Penicillium and Aspergillus. Databases of functional characteristics are expected to be complementary to the known DNA-sequence based databases. The identification is based on visual as well as secondary metabolite profiles. Secondary metabolites are end products of the bio-chemical processes that take place within cells of all living organisms, and they are therefore indirectly descriptive of the cells metabolic processes. If different cells use different processes, there will also be a difference in the variety of metabolites produced. Furthermore the chemical variation in the metabolites can be directly related to ecology and habitat.

Department of Informatics and Mathematical Modeling

Department of Biotechnology
Period: 01/01/2000 → 31/12/2003
Number of participants: 4
Project participant:
Carstensen, Jens Michael (Intern)
Frisvad, Jens Christian (Intern)
Smedsgaard, Jørn (Intern)
Project Manager, organisational: Larsen, Rasmus (Intern)

Sampling strategy and statistical modelling of exposure
ph.d. project financed by the Danish Research Academy and the Danish National Institute of Occupational Health (AMI). The purpose of the project is to investigate the uncertainty associated with various sampling strategies used for the assessment of individual workers exposure to gases and vapours in the working environment.

Department of Informatics and Mathematical Modeling

Department of Applied Engineering Design and Production
Period: 01/01/2000 → 31/12/2002
Number of participants: 3
Project participant:
Nyeland, Martin Erik (Intern)
Olsen, Erik Ekholm (Intern)
Project Manager, organisational: Thyregod, Poul (Intern)

Scaling from individuals to populations (SLIP) (38726)
The research school SLIP (Scaling from Individuals to Populations) focuses on how individual behavior and mutual interactions generate the dynamics observed at the population level. This topic forms the link between the basic and applied marine ecological research environments in Denmark and requires input from biology, mathematics and statistics. SLIP is one of the five research networks and research schools under the Danish Network for Aquaculture and Fisheries Research (Fishnet). SLIP has arranged a number of national and international PhD courses and workshops and has served to focus the interest on size and trait-based modeling, as well as on improved understanding of the physiology, genetics and behavior of marine organisms, in particular fish.
The project is coordinated by DTU Aqua.

DTU Data Analysis
National Institute of Aquatic Resources
Section for Marine Living Resources
Roskilde University
Royal Veterinary and Agricultural University
Aarhus University

University of Copenhagen
Period: 01/01/2000 → 31/12/2008
Number of participants: 9
Research area: Marine Populations and Ecosystem Dynamics
Project participant:
Höffle, Hannes (Intern)
Gürkan, Zeren (Intern)
Therkildsen, Nina Overgaard (Intern)
Sichlau, Mie Hylstofte (Intern)
Mosgaard, Thomas (Intern)
Frisk, Christina (Intern)
Project Manager, academic:
Gislason, Henrik (Intern)
Kiørboe, Thomas (Intern)
Eg Nielsen, Einar (Intern)

Statistisk modellering af antal trafikuheld i Danmark
Department of Informatics and Mathematical Modeling
Period: 01/01/2000 → 16/02/2004
Number of participants: 5
Phd Student:
Christens, Peter (Intern)
Main Supervisor:
Thyregod, Poul (Intern)
Examiner:
Spliid, Henrik (Intern)
Elvik, Rune (Ekstern)
Wegman, Fred (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Offentlig finansiering
Project: PhD

Storskala parallelberegning af exciterbare cellers dynamik i to dimensioner
Department of Mathematics
Period: 01/01/2000 → 01/03/2002
Number of participants: 2
Phd Student:
Petersen, Mette Vesterager (Intern)
Main Supervisor:
Sørensen, Mads Peter (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut, samfinansiering
Reinholdt W. Jorck og hustru fond

Department of Mathematics
Period: 16/12/1999 → 31/10/2010
Number of participants: 1
Project participant:
Markvorsen, Steen (Intern)

Financing sources
Source: Gaver, Private danske Fonde
Name of research programme: Gaver, Private danske Fonde
Amount: 150,000.00 Danish Kroner
Project

Fotogrammetrisk opbygning af 3D landskabs- og bymodeller

Department of Informatics and Mathematical Modeling
Period: 01/12/1999 → 28/10/2004
Number of participants: 7
Phd Student:
Olsen, Brian Pilemann (Intern)
Supervisor:
Frederiksen, Poul (Intern)
Knudsen, Per (Intern)
Main Supervisor:
Jacobi, Ole Illum (Intern)
Examiner:
Nielsen, Allan Aasbjerg (Intern)
Colomina, Ismael (Ekstern)
Höhle, Joachim (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskerakademiets Samfinansier
Project: PhD

Signal processing for diagnosis support systems

Department of Informatics and Mathematical Modeling
Period: 01/12/1999 → 06/10/2003
Number of participants: 6
Phd Student:
Sigurdsson, Sigurdur (Intern)
Supervisor:
Larsen, Jan (Intern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Winther, Ole (Intern)
Andersen, Jens Damgaard (Ekstern)
Benediktsson, Jón Atlí (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering
Project: PhD
Intelligent, Interactive Templates and their Application to 3D Medical Modelling

Department of Informatics and Mathematical Modeling
Number of participants: 7
Phd Student:
Darvann, Tron Andre (Intern)
Supervisor:
Conradsen, Knut (Intern)
Kreiborg, Sven (Ekstern)
Main Supervisor:
Ersbøll, Bjarne Kjær (Intern)
Examiner:
Carstensen, Jens Michael (Intern)
Cootes, Timothy Francis (Ekstern)
Mars, Michael (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Ansat eksternt CAMP
Project: PhD

THALAMUS
THALAMUS is a EUREKA-project with Swedish and Danish partners based on an in depth analysis of present in the health care system regarding patient information: The complexity of acquisition and exchange, journal administration, image administration in regards to digitizing of information and various electronic formats. The lack of opportunities for free flow of information is a significant obstacle for further rationalization of the daily operation at any hospital department and minor health care units. At the same time the opportunity for quality and assurance is disabled. The introduction of the electronic patient journal has only resolved a limited part of the mentioned problem where Thalamus aims towards a complete solution with facilities making digitizing of all types of patient information, text, images, sound, film and at the same time integration these, with the possibility for immediate acquisition and transmission.

Department of Informatics and Mathematical Modeling
Meditel A/S
Aalborg University
MediBase A/S
Sysdemo Mimer AB
National University Hospital
Panum Instituttet
Period: 20/10/1999 → …
Number of participants: 1
Project Manager, organisational:
Larsen, Jan (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 0.00 Danish Kroner
Project

Mathematical/Numerical Modelling of Irregular Nonlinear water Waves
Project No.: 10-00-1286 Ph.D.project: Henrik Bredmose Funding: DTU

Department of Informatics and Mathematical Modeling
Period: 01/10/1999 → 31/12/2002
Number of participants: 2
Project participant:
Bredmose, Henrik (Intern)
Project Manager, organisational:
Madsen, Per A. (Intern)

Project

Virtual reality - collaborative work
Department of Informatics and Mathematical Modeling
Period: 01/10/1999 → 26/11/2004
Number of participants: 5
Phd Student:

Larsen, Bent Dalgaard (Intern)
Main Supervisor:
Christensen, Niels Jørgen (Intern)
Examiner:
Henriksen, Knud (Ekstern)
Chalmers, Alan (Ekstern)
Myszkowski, Karol (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

IEEE International Workshop on Multimedia Signal Processing, 1999
Project No. 1279. Responsible for the accomplishment of the paper submission, technical program, invited speakers, and conference site. The Workshop is sponsored by Nokia A/S, Teledanmark A/S, Thriges Fond, The Danish National Center for IT Research, and IMM DTU. The workshop was carried out in the period Monday September 13 - 15. The homepage of

Department of Informatics and Mathematical Modeling
Period: 13/09/1999 → 15/09/1999
Number of participants: 1
Project Manager, organisational:

Sørensen, John Aasted (Intern)

All-Optical Signal Processing in Quadratic Nonlinear Materials
Danish Technical Scientific Research Council Projektno. 1280

Department of Informatics and Mathematical Modeling
Period: 01/09/1999 → 31/03/2002
Number of participants: 2
Project participant:

Corney, Joel Frederick (Intern)
Project Manager, organisational:

Bang, Ole (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 648,000.00 Danish Kroner
Project

Freight Wagon Dynamics and Safety
Department of Informatics and Mathematical Modeling
Period: 01/09/1999 → 25/10/2002
Number of participants: 6
Phd Student:

Xia, Fujie (Intern)
Geometric knot theory with applications to proteins

This project focuses on relations between the geometry of protein backbones and the geometry of framed space curves. This is done with the purpose of finding continuous models of protein backbones, such that protein structure and dynamics can be studied by methods of (global) differential geometry and infinite dimensional dynamical systems.

Department of Mathematics
Department of Physics
Period: 01/09/1999 → 31/08/2001
Number of participants: 2
Project participant:
Bohr, Henrik (Intern)
Project Manager, organisational:
Røgen, Peter (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU, Samfinansiering
Project: PhD
Pedersen, Thorkild Find (Intern)
Supervisor:
Gram-Hansen, Klaus (Ekstern)
Hansen, Per Christian (Intern)
Herlufsen, Henrik (Ekstern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Sørensen, Helge Bjarup Dissing (Intern)
Pedersen, Jacob Mørch (Ekstern)
Randall, R. B. (Ekstern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: Erhvervsforskerordningen
Project: PhD

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**Nonlinear dynamics of optical polymers**

Department of Informatics and Mathematical Modeling
Period: 01/09/1999 → 01/09/1999
Number of participants: 2
Phd Student:
Broe, Jacob (Intern)
Main Supervisor:
Christiansen, Peter Leth (Intern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: DTU, Samfinansiering
Project: PhD

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**Ph.D. Project: Multichannel Adapтив Analysis of Rotating Systems (MARS)**

Project No. 3140. The objectives of the project are to develop methods for the estimation and tracking of the fundamental frequency components in rotating systems, without using tachometers, but only accelerometer measurements from different acquisition points on the system being investigated. Furthermore, the multichannel measurements must be used for the estimation of parameters, which can be used for the diagnosis of unbalance, misalignment, bent shaft and instability in journal bearings and mechanical looseness, and incipient faults in rolling-element bearings. Projects participants: civilingenior Thorkild Find Pedersen, Bruel & Kjaer A/S, ph.d. studnet. Supervisors: civilingenior Henrik Herlufsen, Bruel & Kjaer A/S, civilingenior Ole Roth, Bruel & Kjaer A/S, civilingenior, ph.d. Klaus Gram-Hansen, Gram & Juhl ApS, Professor Per Chr. Hansen, IMM, DTU, lektor Steffen Duus Hansen, IMM, DTU, lektor John Aa. Sørensen, IMM, DTU.

Department of Informatics and Mathematical Modeling
Period: 01/09/1999 → 31/08/2001
Number of participants: 1
Project Manager, organisational:
Sørensen, John Aasted (Intern)

**Financing sources**
Source: Unknown
Name of research programme: Ukendt
Amount: 1,466,950.00 Danish Kroner
Project

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**Purity-analysis of SEED**

Application of herbiciders is currently reduced substantially in the conventional seed-production. In organic farms a production of grass and clover are being developed, to meet the the needs for ecologically produced seed in the year 2000. These changed methods of cultivation will, no doubt, increase the amount of unwanted seeds in the raw material and therefore increase the need for surveillance and new development of the cleaning process. To meet the increasing demands of the cleaning process the development of a prototype for a vision-based purity-analysis machine have started. The machine aims at a usage in the field of procescontrol of the cleaningproces plus the puritycontrol. The project will, in the development face, focus on one of the most difficult and therefore also one of the most vision-relevant problems, that is
to differ between seeds of meadow grass and 1 year old meadow grass.

Department of Informatics and Mathematical Modeling
Period: 01/09/1999 → 31/08/2001
Number of participants: 3
Project ID: 3147
Project participant:
Frederiksen, Martin Stig (Intern)
Hartelius, Karsten (Intern)

Project Manager, organisational:
Carstensen, Jens Michael (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 300,600.00 Danish Kroner

3D Shape Analysis. Project no.: 1299
Project no.: 1299. The aim of the present project is to describe three dimensional (3D) objects in order to model and simulate the shape variation. This allows for: 1. Knowledge driven design/optimal design. 2. Prediction of the full object based on partial knowledge about the object (occlusion) 3. Prediction of a future object based on previous observations (growth prediction) The methods in the study are based on morphometric tools also called shape analysis. The basis for the analysis is landmark data. Landmarks are homologous points presumed to correspond over the object of a data set. When having only a few landmarks the registration may be performed manually, but for thousands of points it becomes tedious and practically impossible. In many cases punctual landmarks are hard to establish in images, and the process requires considerable prior anatomical knowledge. We search for automated methods for landmark detection in this study. Such methods have already been developed in the Ph.D study by Per Andresen, but must be extended to provide a tool for industrial and medical 3D shape analysis. Having the landmarks defined for the complete data set, we are able to use well known methods from statistics such as Principal Component Analysis (CPA), different tests on the data (like test for distribution, effective dimension of the data etc.), model testing and validation etc.

Department of Informatics and Mathematical Modeling
Period: 01/08/1999 → 31/07/2001
Number of participants: 2
Project participant:
Andresen, Per Rønsholt (Intern)

Project Manager, organisational:
Carstensen, Jens Michael (Intern)

Det medicotekniske grundlag for MR-perfusions måling med kontraststof

Department of Informatics and Mathematical Modeling
Period: 01/08/1999 → 28/03/2003
Number of participants: 6
Phd Student:
Andersen, Irene Klærke (Intern)
Supervisor:
Larsson, Henrik B.W. (Ekstern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Larsen, Jan (Ekstern)
Calamante, Fernando (Ekstern)
Harees, Leif Østergaard (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD
Geometry of finite metric spaces.
The geometry of finite metric spaces, in particular subspaces of Riemannian manifolds, is examined. The central question is how much of topology and geometry that can be decoded from the finite subspace.

Space-Time metrics
Which manifolds can be given Space-Time metrics satisfying certain conditions on causality and curvature?

Numerical prediction of green water loads on ships
Ph.D-project, STVF Name: Kristian Bendix Nielsen; (employed at ISH). The objective of the present Ph.D project is to simulate numerically the dynamics of both the ship and the water at instants of high green water load, and hereby gain better understanding of the underlying processes. This is considered to be a step forward in establishing better tools for the design of safe ships and FPSO's.
Signal and Image Processing for Telemedicine (SITE).
Project No. 3135. The rapid development in sensor technology, signal processing methods and parallel computing technology has enabled the physical realization of complex mathematical models in a diversity of scientific and industrial areas. This beginning interdisciplinary convergence of methodologies in science and technology has already had an impact on several industries and is emerging in medical imaging and more generally in telemedicine. It seems very likely that bringing together specialists from the mentioned areas could further boost the development of medical information processing in Denmark. Such considerations also head to incorporating the disciplines signal processing, scientific computing, and image analysis in the Department of Mathematical Modelling (IMM) together with applied mathematical physics, numerical analysis, operations research, and statistics. Furthermore, there has been established a close cooperation between scientists from DTU and several departments from different hospitals and university clinics.

Methods for the detection and evaluation of traffic safety problems in a road network
The project is concerned with 1) to locate such parts of a road network where accident occurrence is unusually high. This involves detailed studies of the random variation of accident occurrence in time and space 2) to give proposals for technical solutions to the accident occurrences and 3) to set up statistical method for the control of the effects of the technical solutions.

Meloder til detektering og vurdering af trafiksikkerhedsproblemer i vejnettet
Department of Informatics and Mathematical Modeling
Period: 01/06/1999 → 20/09/2002
Number of participants: 7
Phd Student:
Vistisen, Dorte (Intern)
Supervisor:
Laursen, Jan Grubb (Intern)
Nonlinear dynamics of optical polymers

Department of Informatics and Mathematical Modeling

Period: 01/06/1999 → 15/11/2002

Number of participants: 7

Phd Student:

Johansen, Steffen Kjaer (Intern)

Supervisor:

Bang, Ole (Intern)

Examiner:

Bjarklev, Anders Overgaard (Intern)

Baldi, Pascal (Ekstern)

Rasmussen, Jens Juul (Intern)

Financing sources

Source: Internal funding (public)

Name of research programme: Erhvervsforskerordningen

Project: PhD

Optimerings algoritmer til netværks planlægning

Department of Informatics and Mathematical Modeling

Period: 01/06/1999 → 26/01/2003

Number of participants: 6

Phd Student:

Stidsen, Thomas Jacob Riis (Intern)

Supervisor:

Madsen, Oli B.G. (Intern)

Main Supervisor:

Clausen, Jens (Intern)

Examiner:

Juel, Henrik (Intern)

Holmberg, Kaj Evert Ragnar (Ekstern)

Maculan, Nelson F. (Ekstern)

Financing sources

Source: Internal funding (public)

Name of research programme: DTU, Samfinansiering

Project: PhD

Teknisk arbejdshygjien: Prøvetagningsstrategi

Department of Informatics and Mathematical Modeling
The structure of triangle-free graphs

Carsten Thomassen proved in 1999 the conjecture made by Erdos and Simonovits in 1973 that for every c greater than 1/3, the triangle-free graphs of minimum degree at least cn have bounded chromatic number. There is no such result if c is less than 1/3. In collaboration with Adrian Bondy and Stephan Thomasse at Universite Claude Bernard, Lyon, Carsten Thomassen studies density conditions implying triangles in graphs.

EXPLAIN - Explorative Net Planning

EXPLAIN is concerned with strategic planning of communication networks in the telecommunication sector. The goal has been to construct a planning tool to be used both on an operational and a strategic level by net planners. The tool will have a visual user interface for both in- and output, underlying modules dealing with traffic analysis and network construction under varying assumptions on objectives (such as cost and fail-safeness) and constraints, and the ability to handle also scenarios with uncertainty regarding central parameters. The project resulted in three Ph.D.-theses addressing the issues of traffic, physical net planning, and optimization methods in network design. The project part regarding user interface was left unsolved due to recruitment problems. Regarding the optimization methods, the key result was the ability to take into account not only links and their costs, but also nodes and costs of these when designing a communication network in the greenfield case. Also, optimization of the ring architecture for communication networks with protection was considered, and new results questioning the current practice in design of this type of networks was achieved.
Modeller og metoder til analyse af elproduktion i internationalt perspektiv
Department of Informatics and Mathematical Modeling
Period: 01/04/1999 → 07/02/2003
Number of participants: 6
Phd Student: Hindsberger, Magnus (Intern)
Supervisor: Ravn, Hans V. (Intern)
Main Supervisor: Vidal, Rene Victor Valqui (Intern)
Examiner: Thomsen, Per Grove (Intern)
Fosso, Olav Bjarte (Ekstern)
Nissen, Flemming (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Erhvervsforskerordningen
Project: PhD

Spatial solitons, vortices, and patterns in non-linear optical media
Department of Informatics and Mathematical Modeling
Period: 01/04/1999 → 08/11/2002
Number of participants: 8
Phd Student: Bache, Morten (Intern)
Supervisor: Bang, Ole (Intern)
Rasmussen, Jens Juul (Intern)
Saffman, Mark (Intern)
Main Supervisor: Christiansen, Peter Leth (Intern)
Examiner: Tromborg, Bjarne (Intern)
Firth, William J. (Ekstern)
Pedersen, Thomas Garm (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU, Samfinansiering
Project: PhD

Types for DSP Assembler Programs
Department of Informatics and Mathematical Modeling
Period: 01/04/1999 → 26/02/2004
Number of participants: 6
Phd Student: Larsen, Ken (Intern)
Supervisor: Sestoft, Peter (Intern)
Main Supervisor: Sparsø, Jens (Intern)
Examiner: Nielsen, Hanne Riis (Intern)
Hankin, Chris (Ekstern)
Morissett, Greg (Ekstern)

Financing sources
Vindmøllepark-produktionsprediktor
Prediction of the windpower production in Denmark. A prediction model covering wind turbines in question will be installed at 4 major utilities in Denmark, ELSAM, ELKRAFT, SEAS, and ELTRA. The prediction model is based on a combination of online observations and meteorological forecasts. The forecasts will be delivered from DMI using their numerical weather forecasting model, HIRLAM.

Department of Informatics and Mathematical Modeling
Risø National Laboratory

Elkraft A.m.b.A.
SEAS-NVE
Elsam A/S
ELTRA I/S
Danish Meteorological Institute

Period: 01/04/1999 → 31/03/2002
Number of participants: 3
Project participant:
Joensen, Alfred K. (Intern)
Nielsen, Torben Skov (Intern)
Project Manager, organisational:
Madsen, Henrik (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 1,200,000.00 Danish Kroner
Project:

Formelle notationer til specifikation og verification af indlejrede, tidstro systemer

Department of Informatics and Mathematical Modeling

Period: 01/02/1999 → 23/08/2002
Number of participants: 6
Phd Student:
Rasmussen, Thomas Marthedal (Intern)
Supervisor:
Rischel, Hans (Intern)
Main Supervisor:
Hansen, Michael Reichhardt (Intern)
Examiner:
Løvengreen, Hans Henrik (Intern)
Larsen, Kim Guldstrand (Ekstern)
Nipkow, Tobias (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Invariants in differential geometry and elasticity
This project is concerned with finding an explicit fundamental system of invariants, in the case of third order invariants on a surface and in the case of the elasticity tensor in dimension two and three.

Department of Mathematics
Material Interpolation Schemes in Topology Design
In topology optimization of structures, materials and mechanisms, parametrization of geometry is often performed by a grey-scale density-like interpolation function. In this project we analyze and compare the various approaches to this concept, in the light of variational bounds on effective properties of composite materials. This allows for a derivation of simple necessary conditions for the possible realization of grey-scale via composites, leading to a physical interpretation of all feasible designs as well as the optimal design. Thus it has been shown that the so-called artificial interpolation model in many circumstances actually fall within the framework of microstructurally based models. Single material and multi-material structural design in elasticity as well as in multi-physics problems is studied.

Department of Mathematics
Department of Solid Mechanics

Modelling og digital signalbehandling for MR-baseret måling af blodgennemstrømning
Department of Informatics and Mathematical Modeling

Qos-based Systems Design for Real-Time Multimedia
Department of Informatics and Mathematical Modeling
**Algebraic Coding Theory and Cryptology**
Design and analysis for efficient error-correcting coding and cryptography systems with emphasis on the basic problems.

Department of Mathematics
Department of Telecommunication
Aalborg University
Aarhus University

Period: 01/01/1999 → 31/12/2001
Number of participants: 9
Project participant:
Jensen, Helge Elbønd (Intern)
Jensen, Jørn Møller (Intern)
Heydtmann, Agnes Eileen (Intern)
Nielsen, Rasmus Refslund (Intern)
Justesen, Jørn (Intern)
Thommesen, Cristian (Ekstern)
Damgaard, Ivan (Ekstern)
Hansen, Johan P. (Ekstern)

Project Manager, organisational:
Høholdt, Tom (Intern)

**Financing sources**
Source: Unknown
Name of research programme: U肯edt
Amount: 900,000.00 Danish Kroner

**Biomedical sensors**
At Research Center COM we have entered into a collaboration with other DTU institutions (namely Institute of Physics and IMM) and Forskningscenter Risø, concerning biomedical optics (BIOP). The BIOP initiative covers four focus areas. At COM we are primarily involved in the development of optical coherence tomography (OCT) systems, and over the past year, we have in collaboration with Forskningscenter Risø developed a theoretical/numerical model describing the noise-properties of practical OCT systems. In addition to this model, which has been used in the design of next generation OCT systems, detailed modelling of light propagation in random media (living tissue such as skin or eyes) has been performed. Results of this work have been presented at international conferences such as Conference on Optical Tomography and Spectroscopy of Tissue, San Jose, CA. Another key activity for Research Center COM concerning the BIOP collaboration has been the initial investigations of photonic crystal fibres (PCFs) in sensors. Here we make use of the fact that the PCFs contain micron wide holes and provide the possibility for guiding light in these. Hereby, an attractive alternative to evanescent field waveguides becomes possible, and at COM we have applied our detailed numerical tools in describing the waveguiding properties of such new sensor waveguides presented at the International Conference LIGHT FOR LIFE 99 in Cancun, Mexico.

**Fibers & Nonlinear Optics**
Department of Photonics Engineering
Risø National Laboratory for Sustainable Energy
Department of Physics
Department of Informatics and Mathematical Modeling

Period: 01/01/1999 → ...
Number of participants: 5
Project participant:
Tycho, Andreas (Intern)
Buckhave, Preben (Ekstern)
Ersbøll, Bjarne (Ekstern)

Project Manager, organisational:
Bjarklev, Anders Overgaard (Intern)
Petersen, Paul Michael (Ekstern)
Computational Hydrodynamics
The scientific objective of the research program is to develop a number of unique mathematical models and numerical methods for the computation and prediction of the hydrodynamic problems described above. New insight and new prediction methods will be obtained for problems such as surfzone hydrodynamics, scour around large marine structures, ship hydrodynamics and propulsion, vortex-induced vibration of structures and response of moored ships in restricted waters. A new sophisticated experimental facility for multidirectional waves will be used for validation purposes, in conjunction with existing laboratory and field data. Results from the research program will include: - Establishment of a new basic research group at the Technical University of Denmark (DTU) - Education of 5 PhD candidates in collaboration between Danish institutions - Further development of international collaboration e.g. through exchange of PhD students and post docs - Further development of a leading international position within the scientific field - Publication of peer-reviewed journal papers and participation in international conferences - Dissimination of research results and methods to Danish industry and engineering companies

Department of Informatics and Mathematical Modeling
Department of Energy Engineering
Department of Naval Architecture and Offshore Engineering
Department of Hydrodynamics and Water Resources

DHI Denmark
Period: 01/01/1999 → 31/12/2003
Number of participants: 3
Project participant:
Bingham, Harry B. (Intern)
Mayer, Stefan (Intern)

Project Manager, organisational:
Madsen, Per A. (Intern)

Graduate School in Nonlinear Science
Project no. 7317 Educational project aimed at PhD students Collaboration with Department of Optics and Fluid Dynamics, Risø National Laboratory, Center or Chaos and Turbulence Studies, Niels Bohr Institute, University of Copenhagen

Department of Informatics and Mathematical Modeling
Department of Physics
University of Copenhagen
Novo Nordisk A/S

Forskningscenter Risø
Period: 01/01/1999 → 31/12/1999
Number of participants: 8
Project participant:
Scott, Alwyn C. (Intern)
Jensen, M. Hegh (Ekstern)
Colding-Jørgensen, M. (Ekstern)
Johansen, Per Michael (Intern)
Rasmussen, Jens Juul (Intern)
Mosekilde, Erik (Intern)
Sørensen, P. G. (Ekstern)

Project Manager, organisational:
Christiansen, Peter Leth (Intern)

Financing sources
Source: Unknown
Hierarchical optimization of material and structure

In this project we develop a hierarchical computational procedure for optimizing material distribution as well as the local material properties of mechanical elements. The local properties are designed using a topology design approach, leading to single scale microstructures, which may be restricted in various ways, based on design and manufacturing criteria. Implementation issues are a focal point of the investigation and computational experiments are used to illustrate the nature of the procedure.

Department of Mathematics
Instituto Superior Técnico
Period: 01/01/1999 → 31/07/2000
Number of participants: 3
Project participant:
Rodrigues, H. (Ekstern)
Guedes, J.M. (Ekstern)

Project Manager, organisational:
Bendsøe, Martin P. (Intern)

Financing sources
Source: Unknown

Improving the buckling performance of topology designed periodic microstructures

A formulation of linearized buckling for cellular microstructured solids is developed. The goal is to include instability modes in the design of a microstructure. An asymptotic method provides us with the equations for stability analysis at macroscopic and microscopic level and its range of applicability is analyzed. This is then used to address the problem of the buckling performance of cellular microstructures, leading to a buckling performance index concept that provides the basis for a comparative analysis between different distributions of material in the microstructure, as well as the influence of length scale of the buckling mode (single cell or multiple cell modes). This concept is then used to improve the buckling performance of microstructures designed for, e.g., maximal bulk modulus.

Department of Mathematics
Department of Solid Mechanics
Instituto Superior Técnico
Period: 01/01/1999 → 31/12/2000
Number of participants: 3
Project participant:
Sigmund, Ole (Intern)
Neves, M. (Ekstern)

Project Manager, organisational:
Bendsøe, Martin P. (Intern)

Financing sources
Source: Unknown

Metoder til validering af prøvetagningsmetoder for bulkmaterialer

Department of Informatics and Mathematical Modeling
Period: 01/01/1999 → 01/01/2002
Number of participants: 8
Phd Student:
Thyregod, Camilla (Intern)
Supervisor:
Grønlund, Per (Ekstern)
Iwersen, Jørgen (Ekstern)
Tvermoes, Charlotte (Ekstern)
Main Supervisor:
Thyregod, Poul (Intern)
Examiner:
Rootzén, Helle (Intern)
Kristensen, Henning Gjelstrup (Ekstern)
Windfeld, Kristian (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Erhvervsforskerordningen
Project: PhD

Models and methods for hot spot safety work
ph.d. project financed by the Danish Academy of Technical Sciences (ATV) and Carl Bro A/S. The purpose of the project is to develop statistical methods for targeting intersections and road sections in the road network with an unusual high number of accidents.

Department of Informatics and Mathematical Modeling
Department of Transport
Department of Planning

Carl Bro A/S
Period: 01/01/1999 → 31/12/2002
Number of participants: 5
Project participant:
Laursen, Jan Grubb (Intern)
Vistisen, Dorte (Intern)
Aagaard, Pierre (Ekstern)
Nielsen, Michael Aakjer (Ekstern)

Project Manager, organisational:
Thyregod, Poul (Intern)

Non- and semiparametric methods with applications in engineering
The purpose of the project is to collect various research activities within area of non- and semi-parametric methods and application of these. Relevant topics includes applications and developments within the areas of: (i) non- and semi-parametric methods of regression in general, (ii) combination of parametric and non-parametric methods, (iii) adaptive estimation, (iv) structural identification of on-linear time series, (v) non- and semi-parametric methods for dynamic systems

Department of Informatics and Mathematical Modeling
Period: 01/01/1999 → …
Number of participants: 6
Project participant:
Joensen, Alfred K. (Intern)
Nielsen, Henrik Aalborg (Intern)
Nielsen, Torben Skov (Intern)
Sadegh, Payman (Intern)
Øjelund, Henrik (Intern)

Project Manager, organisational:
Madsen, Henrik (Intern)

PRESS installation hos Sonderborg Fjernvarme
Implementering af PRESS prognosesystem hos Sonderborg Fjernvarme. Samarbejdsaftale.

Department of Informatics and Mathematical Modeling
Sønderborg Fjernvarme A.m.b.a.
Period: 01/01/1999 → 31/12/2000
Number of participants: 2
Project participant:
Nielsen, Torben Skov (Intern)
Project Manager, organisational:
Madsen, Henrik (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 64,000.00 Danish Kroner

RTMM (Real Time Multimedia Systems)
The project concentrates on the technical issues involved in systems for Interactive Distributed Multimedia (IDMM). It is part of the larger project DMM, Distributed Multimedia - Technologies and Applications that deals with many aspects of the development and use of distributed multimedia. The project is supported by the Danish Research Councils 1998-2001.

Department of Photonics Engineering
Department of Information Technology
Department of Informatics and Mathematical Modeling
Department of Telecommunication
Period: 01/01/1999 → 01/01/2001
Number of participants: 3
Project participant:
Fosgerau, Anders (Intern)
Ehlers, Kristian John (Intern)
Project Manager, organisational:
Dittmann, Lars (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 1,000,000.00 Danish Kroner

Source Localisation from EEG
Patients with severe epilepsy may sometimes be cured by removing tissue containing "epileptogenic" centre from the brain, through a surgical procedure. Multielectrode EEG recordings can help to pinpoint the location of the epileptogenic centre through inverse modelling, using eg dipole models, and spheric or anatomically based head models. The project aims to identify capabilities of existing software and algorithms and their further potential for use in clinical work.

Department of Informatics and Mathematical Modeling
Period: 01/01/1999 → 31/03/1999
Number of participants: 4
Project participant:
Rasmussen, Carl Edward (Intern)
Madsen, Flemming-Find (Ekstern)
Hoegenhaven, Hans (Ekstern)
Project Manager, organisational:
Hansen, Lars Kai (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 75,000.00 Danish Kroner
Statistical methods for assessment of blend homogeneity
ph.d. project financed by the Danish Academy of Technical Sciences (ATV) and Novonordisk A/S. The purpose of the project is to discuss acceptance criteria for blend and tablet batches in pharmaceutical production.

Department of Informatics and Mathematical Modeling
Novo Nordisk A/S
Period: 01/01/1999 → 31/12/2002
Number of participants: 5
Project participant:
Thyregod, Camilla (Intern)
Iwersen, Jørgen (Ekstern)
Grøvenlund, Per (Ekstern)
Tvermoes Rezai, Charlotte (Ekstern)

Stereoskopi 2: C-M-C, 1999-2003
Der er udviklet en ny kategori af metoder til farvekodning af stereoskopiske billede. Metoden er i princippet anvendelig til de fleste formål, der anvender eller vinder ved stereoskop, men sigter pri- maærligt imod sådanne (som f.eks. udstillinger), hvor betragtningsvilkårene er varierende og hvor gengivelse af stereobilledet i fysiske omgivelser skal kunne optimeres.

Department of Informatics and Mathematical Modeling
United Exhibits A/S
Period: 01/01/1999 → 31/12/2003
Number of participants: 1
Project Manager, organisational:
Hansen, Per Skafte (Intern)

Winterschool on Information and coding theory
A winterschool for ph.d. students from Europe and their supervisors was held at Ebeltoft Strand. The subject was Information Theory and Coding Theory.

Department of Mathematics
Number of participants: 1
Project Manager, organisational:
Høholdt, Tom (Intern)

Kvantitativ sammenligning af brystkræftmaterialet i Cancerregistret og DBCG's database
Data fra Cancerregistret (CRG) and Danish Breast Cancer Groups (DBCGs) register anvendes hyppigt ved opgørelser og videnskabelige undersøgelser. Specielt anvendes data fra DBCGs registre ofte i kliniske og epidemiologiske undersøgelser, blandt andet fordi mange af de for prognosen interessante oplysninger kun er tilgængelige i DBCGs register, og fordi kvaliteten af data, alt andet lige, bør være bedre i en klinisk database end i et epidemiologisk minimumsregister. Det er således af interesse at undersøge kompletheden såvel af CRG som af DBCGs register. The aim of the study is to compare the breast cancer patient material in the Danish Cancer Registry and the DBCG clinical database. The purpose of the Danish Cancer Registry and the DBCG clinical database is quite different. Therefore it is not surprising that the main part of the differences can be accounted for by systematical conditions.

Department of Informatics and Mathematical Modeling
Kæftens Bekæmpelse
Period: 02/12/1998 → 31/12/1999
Number of participants: 2
Project participant:
Rostgaard, Klaus (Ekstern)

Project Manager, organisational:
Rootzén, Helle (Intern)
**Storskala inversionsalgoritmer**

Department of Informatics and Mathematical Modeling

Period: 01/12/1998 → 20/01/2003  
Number of participants: 8  
Phd Student:  
Berglund, Eva Ann-Charlotte (Intern)  
Supervisor:  
Bendtsen, Claus (Intern)  
Jacobsen, Bo Holm (Ekstern)  
Madsen, Kaj (Intern)  
Main Supervisor:  
Hansen, Per Christian (Intern)  
Examiner:  
Nielsen, Hans Bruun (Intern)  
Mosegaard, Klaus (Intern)  
Rojas Larrazabal, Marielba de la Caridad (Intern)  

**Financing sources**

Source: Internal funding (public)  
Name of research programme: Samarbejdsaftalefinans  
Project: PhD

**Corrosion Monitoring Device**

A device for monitoring corrosion of steel bars in concrete in sea water is constructed, and a mathematical model is developed with the purpose of giving an easy way to predict when the steel bars will start corroding, causing damage to the structure. The project is part of EUREKA. Project leader is Ervin Poulsaen, Aps., in cooperation with AEC and the FORCE Institute (the Corrosion Central). First report included in Ervin Poulsen, Jens M. Frederiksen, Leif Mejbro, Chloride Exposed RC-Structures, NIST/ACI/ASTM Workshop, Gaithersburg MD USA, November 9-10, 1998

Department of Mathematics  
Period: 06/10/1998 → ...  
Number of participants: 1  
Project Manager, organisational:  
Mejlbro, Leif (Intern)

**Adaptive tools for shared virtual environments**

Department of Informatics and Mathematical Modeling  
Period: 01/10/1998 → 26/09/2002  
Number of participants: 7  
Phd Student:  
Kolenda, Thomas (Intern)  
Supervisor:  
Christensen, Niels Jørgen (Intern)  
Larsen, Jan (Intern)  
Main Supervisor:  
Hansen, Lars Kai (Intern)  
Examiner:  
Sørensen, Helge Bjarup Dissing (Intern)  
Andreasen, Troels (Ekstern)  
Jensen, Søren Holdt (Intern)  

**Financing sources**

Source: Internal funding (public)  
Name of research programme: Forskningsrådsstipendium  
Project: PhD
Data Mining in Hydraulics
Department of Informatics and Mathematical Modeling
Period: 01/10/1998 → 14/06/2002
Number of participants: 6
Phd Student: Keijzer, Maarten (Intern)
Supervisor: Babovic, Vladan (Eksterne)
Main Supervisor: Hansen, Lars Kai (Intern)
Examiner: Larsen, Jan (Eksterne)
Banzhaf, Wolfgang (Eksterne)
Mayoh, Brian (Eksterne)

Financing sources
Source: Internal funding (public)
Name of research programme: Blandet Finansiering
Project: PhD

Identification of mental states from EEG
Analysis of multichannel EEG from subjects engaged in meditation is carried out for the purpose of characterising this mental state.

Department of Informatics and Mathematical Modeling
Period: 01/10/1998 → 31/12/1998
Number of participants: 3
Project participant: Rasmussen, Carl Edward (Intern)
Kjaer, Troels W. (Eksterne)
Project Manager, organisational: Hansen, Lars Kai (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 75,000.00 Danish Kroner
Project

Image processing and topology optimization
Structural optimization, posed as finding the optimal distribution of material and void is well known as a mathematically ill-posed problem. This ill-posedness nature expresses itself in the lack of compactness of the set of allowed domains and is commonly considered as being the cause of some numerical problems like mesh dependency, for example. Many solutions have been proposed in order to address this lack of solution and build strong and accurate numerical approximations. In most of these method, the "black-or-white" character of the domain (i.e. material OR void) is replaced with a "gray-level" density function, allowed to take its values between 0 and 1 (0 representing then void while 1, material). Then, one can choose between a penalization of the perimeter of the designed domain (i.e. a penalization of the Total Variation of the density function), a extra bound on the gradient of the density function or the use of a filtering technique. All these methods are strongly related to the problem known in the image processing domain as "image restoration", i.e. trying to reverse the alterations (noise, blur...) made on an image. The main goal of the project is the use of image processing knowledges to help understanding the filtering technique, reinforce its theoretical foundations and improve its implementation.

Department of Mathematics
Chambolle Antonin
Period: 01/10/1998 → 31/12/1999
Number of participants: 1
Project Manager, organisational:
Bourdin, Blaise (Intern)
Modelling of the geoid and the north Atlantic Sea level

Department of Informatics and Mathematical Modeling
Period: 01/10/1998 → 27/03/2002
Number of participants: 6
Phd Student:
Hilger, Klaus Baggesen (Intern)
Supervisor:
Nielsen, Allan Aasbjerg (Intern)
Main Supervisor:
Ersbøll, Bjarne Kjær (Intern)
Examiner:
Madsen, Henrik (Ekstern)
Switzer, Paul (Ekstern)
Windfeld, Kristian (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsstipendium
Project: PhD

Statistisk 3-D beregning af sandsynligheden for at finde en jordforurening.

Department of Informatics and Mathematical Modeling
Period: 01/10/1998 → 31/12/1998
Number of participants: 1
Project Manager, organisational:
Rootzén, Helle (Intern)

The GEOid and Sea level Of the North Atlantic Region (GEOSONAR). Project no.: 1217, Ph.D-student Klaus Baggesen Hilger
Project no.: 1217 Financed by: "GEOSONAR"

Department of Informatics and Mathematical Modeling
Period: 01/10/1998 → 01/10/2001
Number of participants: 2
Project participant:
Hilger, Klaus Baggesen (Intern)
Project Manager, organisational:
Ersbøll, Bjarne Kjær (Intern)

Analysis of two-dimensinal electrophoresis images. Project no.: 1276, Ph.D-student Lars Pedersen
Project no.: 1276 Financed by: "CPA", The Center for Proteom Analysis.

Department of Informatics and Mathematical Modeling
Number of participants: 2
Project participant:
Pedersen, Lars (Intern)
Project Manager, organisational:
Ersbøll, Bjarne Kjær (Intern)
Analysis of two-dimensional electrophoresis images

Department of Informatics and Mathematical Modeling
Period: 01/09/1998 → 14/06/2002
Number of participants: 7
Phd Student:
Pedersen, Lars (Intern)
Supervisor:
Conradsen, Knut (Intern)
Fey, Stephen John (Ekstern)
Main Supervisor:
Ersbøll, Bjarne Kjær (Intern)
Examiner:
Larsen, Rasmus Werner (Intern)
Glasbey, Christopher Andrew (Ekstern)
Johansen, Peter (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Anden Forskningsrådsfinan.-SU
Project: PhD

Fejlkorrigerede koder baseret på algebraisk geometri

Department of Mathematics
Period: 01/09/1998 → 14/12/2001
Number of participants: 4
Phd Student:
Nielsen, Rasmus Refslund (Intern)
Main Supervisor:
Høholdt, Tom (Intern)
Examiner:
Justesen, Jørn (Intern)
Sudan, Madhu (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Investigation of the Effectiveness of Co-Array Fortran

Department of Informatics and Mathematical Modeling
Rutherford Appleton Laboratory
Period: 01/09/1998 → 31/12/2000
Number of participants: 3
Project participant:
Rasmussen, Jan M. (Ekstern)
Reid, John (Ekstern)
Project Manager, organisational:
Hansen, Per Christian (Intern)

Low Power Digital Signal Processing

Department of Informatics and Mathematical Modeling
Period: 01/09/1998 → 21/01/2003
Number of participants: 4
Phd Student:
Paker, Ozgun (Intern)
Ph.D. project: Multichannel Systems for Combined Adaptive Noise Reduction and Signal Separation

The research goal is the development of noise reduction/signal separation methods, based on a combination of spatial localization, subspace filtering and application of model information on the signals being noise reduced or separated. In particular there is aimed for noise reduction, spatial localization and separation of speech signals and a selection of impulse noise and broad band noise sources.

Department of Informatics and Mathematical Modeling
Period: 01/09/1998 → 31/08/2001
Number of participants: 5
Project participant:
Hansen, Steffen Duus (Intern)
Hansen, Per Christian (Intern)
Kidmose, Preben (Intern)

Kidmose, Preben (Intern)
Project Manager, organisational:
Sørensen, John Aasted (Intern)

Kidmose, Preben (Intern)

Financing sources
Source: Unknown
Name of research programme: Uekndt
Amount: 1,200,000.00 Danish Kroner
Project

Stochastic model of the duration of a project.
The purpose of the project is to criticize and improve an existing stochastic model of the duration of a project, proposed by Steen Lichtenberg in his book 'Projektplanlægning - i en foranderlig verden' (Project planning - in a changing world). It is an important part of the project to discuss the implications of the model in the light of the difference between the 'degree of belief' and the 'relative frequency' - interpretation of the mathematical concept of probability. The work is done in
cooperation with Henrik Kruchow, Kruchow consulting - who uses Lichtenbergs model as a practical tool in project planning

Department of Informatics and Mathematical Modeling
Period: 01/09/1998 → 31/12/1999
Number of participants: 1
Project Manager, organisational:
Hansen, Niels Herman (Intern)

VIDIGEO (Visual Interactive Differential Geometry)
A modern tool for the learning of elementary differential geometry is being developed. One key feature will be the inclusion of the computer at several levels in the teaching and learning process.

Department of Mathematics
Aalborg University
Aarhus School of Engineering
Period: 01/09/1998 → ...
Number of participants: 6
Project participant:
Gravesen, Jens (Intern)
Sinclair, Robert (Intern)
Fajstrup, Lisbeth (Ekstern)
Karstoft, Henrik (Ekstern)
Raussen, Martin (Ekstern)
Project Manager, organisational:
Markvorsen, Steen (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 60,000.00 Danish Kroner

Optimal topology design of dissipative structures
This project is concerned with the crashworthiness design of structures. The aim of the project is to develop basic optimization concepts for the lay-out design (topology design) of dissipative systems. Presently computational cost prevents the large scale optimization to be coupled with a full crash analysis. Moreover, it is unclear how the basic design modelling of continuum topology design can be applied to such problems. The key idea is thus to simplify the modelling of geometry, analysis and design - using groundstructure type ideas - to an extent where central concepts can be developed emphasizing the design optimization perspective, while capturing the fundamental physics of the problem.

Department of Mathematics
Department of Solid Mechanics
University of Michigan
Period: 01/08/1998 → ...
Number of participants: 4
Project participant:
Sigmund, Ole (Intern)
Pedersen, Claus B. Wittendorf (Intern)
Taylor, J.E. (Ekstern)
Project Manager, organisational:
Bendsøe, Martin P. (Intern)

Project-no.: 1223.Center for IT-Research (CIT)
Department of Informatics and Mathematical Modeling
Period: 01/08/1998 → 31/12/1999
Number of participants: 5
Project participant:
**Maintenance- and replacement strategies for complex systems.**

The aim of the project is to investigate and develop strategies for condition monitoring, i.e., inspection, maintenance and repair of complex systems under consideration to actual condition, repair history and desired reliability of the system.

Department of Informatics and Mathematical Modeling

Danish Defence Research Establishment

**Period:** 01/07/1998 → 30/06/2001

**Number of participants:** 1

Project Manager, organisational:

Thyregod, Poul (Intern)

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**Teknikker til 3D visualisering, billedbehandling og simulering**

Department of Informatics and Mathematical Modeling

**Period:** 01/07/1998 → 03/05/2002

**Number of participants:** 6

Phd Student:

Holten-Lund, Hans Erik (Intern)

Supervisor:

Madsen, Jan (Intern)

Main Supervisor:

Pedersen, Steen (Intern)

Examiner:

Christensen, Niels Jørgen (Intern)

Ernst, Rolf (Ekstern)

Slusallek, Philipp (Ekstern)

**Financing sources**

Source: Internal funding (public)

Name of research programme: Ansat eksternt

Project: PhD

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**Vedligeholds- og udskiftningsstrategier for komplekse systemer**

Department of Informatics and Mathematical Modeling

**Period:** 01/07/1998 → 28/05/2003

**Number of participants:** 6

Phd Student:

Pedersen, Thomas Espelund (Intern)

Supervisor:

Livbjerg, Steen (Ekstern)

Main Supervisor:

Thyregod, Poul (Intern)

Examiner:

Spliid, Henrik (Intern)

Bergman, Bo (Ekstern)

Lindqvist, Bo (Ekstern)

**Financing sources**

Source: Internal funding (public)

Name of research programme: Ansat eksternt CAMP
**Workshop in Algebraic Coding Theory**
A workshop on codes from Algebraic geometry and trellis decoding of block codes was held at the department of Mathematics

*Department of Mathematics*
*Number of participants:* 1
*Project Manager, organisational:*
Høholdt, Tom (Intern)

**Financing sources**
*Source:* Unknown
*Name of research programme:* Ukendt
*Amount:* 30,000.00 Danish Kroner

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**Forbedring af Videobilledsekvenser**
Udvikling af soft- og hardware applikationer til forbedring af videobilleder (sekvenser), med særlig henblik på overførsel til film.

*Department of Informatics and Mathematical Modeling*
*Hokus Bogus Aps.*
*Context Vision AB*
*Period:* 23/06/1998 → …
*Number of participants:* 1
*Project Manager, organisational:*
Ersbøll, Bjarne Kjær (Intern)

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**Bladder tumors**
Dansk Urologisk Selskab har nedsat en arbejdsgruppe, der skal planlægge en landsdækkende registrering af patienter med blæretumor i Danmark med henblik på at forbedre, standardisere og rationalisere behandlingen af denne patientgruppe. Arbejdet tager udgangspunkt i det eksisterende BCR (Blære Cancer Registret), der kontinuerligt har akkumuleret data fra blæretumorpatienter gennem 10 år på Herlev og Skejby hospitaler.

*Department of Informatics and Mathematical Modeling*
*Blærecancer registreringsgruppen*
*Period:* 01/06/1998 → 31/10/1999
*Number of participants:* 2
*Project participant:*
Hermann, Gregers (Ekstern)
*Project Manager, organisational:*
Rootzén, Helle (Intern)

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**Future IT-infrastructure in the Folketing**
The project group at DTU has made suggestions and recommendations for introducing advanced TV, video and telephone applications in the Danish parliament, The Folketing. These suggestions are based on discussions with the technical staff at The Folketing and a number of presentations by, and discussions with, leading technology vendors. Furthermore some products has been tested and evaluated.

*Department of Information Technology*
*Department of Telecommunication*
*Department of Informatics and Mathematical Modeling*
*Department of Photonics Engineering*
*Period:* 01/06/1998 → 31/12/1998
*Number of participants:* 5
Project participant:
Sharp, Robin (Intern)
Forchhammer, Søren (Intern)
Jensen, Ole Riis (Intern)
Staalhagen, Lars (Intern)
Project Manager, organisational:
Pedersen, Steen (Intern)

**Financing sources**
Source: Unknown
Name of research programme: *Ukendt*
Amount: 250,000.00 Danish Kroner

**Modellering, visualisering og metaanalyse af hjernebilleder**

Department of Informatics and Mathematical Modeling
Period: 01/05/1998 → 11/09/2002
Number of participants: 6
Phd Student:
Nielsen, Finn Årup (Intern)
Supervisor:
Larsen, Jan (Intern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Thyregod, Poul (Intern)
Andersen, Jens Damgaard (Ekstern)
Roland, Per Ebbe (Ekstern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: Forskningsrådsstipendium

**Optimizing system level design of mobile phones**

Department of Informatics and Mathematical Modeling
Period: 01/05/1998 → 01/10/2003
Number of participants: 2
Phd Student:
Bjørn-Jørgensen, Peter (Intern)
Main Supervisor:
Madsen, Jan (Intern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: Samarbejdsaftalefinans

**Ph. D. Project: Finn Årup Nielsen: Analysis, Visualization and Metaanalysis of Neuroimages**

Department of Informatics and Mathematical Modeling
Period: 01/04/1998 → 31/03/2001
Number of participants: 3
Project participant:
Larsen, Jan (Intern)
Nielsen, Finn Årup (Intern)
Project Manager, organisational:
Hansen, Lars Kai (Intern)
**THOR Center for Neuroinformatics**

Neuroinformatics is a research field rooted in classical disciplines like signal processing, biology, physics, computer science and engineering. Neuroinformatics combines learning from the brain and learning about the brain. By studying information processing in the brain neuroinformatics invents new computing paradigms (e.g., artificial neural networks) with the objective of understanding the dynamics of the conscious mind. Neuroinformatics is a key component of a US research program, the Human Brain Project which is supported by all the major American governmental funding agencies and hosted by the National Institute of Health. The geographically and scientifically distributed nature of the collaborating research groups involved in this interdisciplinary neuroscience effort calls for new visual and interactive means of communication. A point strongly emphasized in this program is the need for using the World Wide Web for communication and dissemination of results. With partners in the Copenhagen area we have established the "Copenhagen Brain Research Center".

Department of Informatics and Mathematical Modeling

Period: 01/04/1998 → …

Number of participants: 3

Project participant:

Larsen, Jan (Intern)
Nielsen, Finn Årup (Intern)

Project Manager, organisational:

Hansen, Lars Kai (Intern)

**Financing sources**

Source: Unknown
Name of research programme: Ukendt
Amount: 1,616,400.00 Danish Kroner

Source: Unknown
Name of research programme: Ukendt
Amount: 3,610,000.00 Danish Kroner

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**Object Oriented Software for Large Scale Air Pollution Models**

PhD project no.:10-00-1261 Student: Anton Antonov Antonov Finance:Forskerakademiet Object Oriented (OO) program development offers tools to improve existing Air Pollution models giving more flexibility and improved efficiency. The project is based on the existing Danish Eulerian Model.

Department of Informatics and Mathematical Modeling

UNI-C

Danmarks Miljøundersøgelser
Period: 01/03/1998 → 28/02/2001
Number of participants: 2

Project participant:

Antonov, Anton Antonov (Intern)

Project Manager, organisational:

Thomsen, Per Grove (Intern)

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**Virtue reality - Volume sculpting**

Department of Informatics and Mathematical Modeling

Period: 01/03/1998 → 06/03/2003
Number of participants: 5
PhD Student:

Bærentzen, Jakob Andreas (Intern)

Main Supervisor:

Christensen, Niels Jørgen (Intern)

Examiner:

Henriksen, Knud (Ekstern)
Chen, Min (Ekstern)
Takala, Tapio (Ekstern)
Breast cancer incidence and mortality

In Denmark, as in all western countries, breast cancer mortality has remained relatively stable. The most obvious explanations for the empirically improved survival would be improved treatment or earlier diagnosis, possibly caused by screening. If earlier diagnosis was the most important explanation one would expect to see a small change in stage specific survival, but a large change in the stage distribution towards less advanced stages of the disease in the time of diagnosis, and vice versa if improved treatment was the most important explanation. Obviously it is important to be able to distinguish between these two explanations. In the project we focus on answering the following questions: How is the breast cancer stage distribution in Denmark 1978 - 94? Why has the stage distribution of breast cancers at time of diagnosis improved in Denmark 1978-94?.

Department of Informatics and Mathematical Modeling

Danish Cancer Society

Aarhus University

Danish Institute of Clinical Epidemiology

University of Copenhagen

Period: 01/02/1998 → 31/12/2005

Number of participants: 7

Project participant:

Rostgaard, Klaus (Ekstern)

Lynge, Elsebeth (Ekstern)

Vaæth, Michael (Ekstern)

Madsen, Mette (Ekstern)

Mouridsen, Henning (Ekstern)

Olesen, Knud P. (Ekstern)

Project Manager, organisational:

Rootzén, Helle (Intern)

Project

Error correcting codes: The basic problems

Department of Mathematics

Period: 01/02/1998 → 29/05/2001

Number of participants: 6

Phd Student:

Heydtmann, Agnes Eileen (Intern)

Supervisor:

Heholdt, Tom (Intern)

Main Supervisor:

Jensen, Jørn Møller (Intern)

Examiner:

Jensen, Helge Elbønd (Intern)

Pellikaan, Ruud (Ekstern)

Stichtenoth, Henning (Ekstern)

Financing sources

Source: Internal funding (public)

Name of research programme: DTU-lønnet stipendie

Project: PhD

Ikke-lineære pulser i optiske medier

Department of Informatics and Mathematical Modeling

Period: 01/02/1998 → 29/05/2001

Number of participants: 7
PhD Student: 
Schjødt-Eriksen, Jens (Intern)
Supervisor: 
Rasmussen, Jens Juul (Intern)
Sørensen, Mads Peter (Intern)
Main Supervisor: 
Christiansen, Peter Leth (Intern)
Examiner: 
Mørk, Jesper (Intern)
Bergé, Luc (Ekstern)
Johansen, Per Michael (Intern)

Financing sources 
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

IT based optimization of District Heating Networks
The project's superior objective is to work as a catalyst for distribution and practical use of a number of optimization methods and tools for the district heating sector. By collecting these functions in one modern IT-tool and by introducing new working methods, the project will work as a lever and make these optimizations practically operational and attractive for the district heating companies. It is the aim of the IT-tool to be able to integrate a number of functions, such as: * Network tools for dimensioning and analysis. * Optimization of storage tanks and other supply sources. * Strategies for optimum pump operation and control. * Advanced forecasts and temperature controllers. * On-line measurements and status from SCADA systems. * Geographic map information from pipe registration / GIS systems. * Information from customer databases. * An uncomplicated and clear presentation of deviations from the optimum operation condition. The main contributions from DTU/IMM are: * Installation of the DTU/IMM on-line system PRESS (Prognose- og EnergiStyrings System) at Frederiksberg VarmeVærk. * Research regarding heat load forecasting using on-line meteorological forecasts. * Research regarding optimal load scheduling of storage tanks.

Department of Informatics and Mathematical Modeling
ABB Energi & Industri A/S
Period: 01/02/1998 → 31/12/2002
Number of participants: 3
Project participant:
Madsen, Henrik (Intern)
Laursen, Peter (Ekstern)
Project Manager, organisational:
Nielsen, Henrik Aalborg (Intern)

IT-baseret driftoptimering af fjernvarmedistribution
Projektets formål er at udvikle og afprove modeller og metoder til langtidsforudsigelser (op til 5-7 døgn) af varmebehovet i fjernvarmesystemer. Samtidig skal der udvikles og af proves metoder til optimering af driften af akkumulatortanke. Disse metoder vil udnytte saavel forudsigelser af varmebehov som tidligere udviklede metoder til bestemmelse af optimal fremlobstemperatur.

Department of Informatics and Mathematical Modeling
VESTKRAFT
VEKS
ABB Energi & Industri A/S
Rambøll Danmark A/S
Frederiksberg VarmeVærk
Period: 01/02/1998 → 30/10/2000
Number of participants: 3
Project participant:
Nielsen, Henrik Aalborg (Intern)
Nielsen, Torben Skov (Intern)
Neural process optimization of pulse plating in the electronic industry

The purpose of the project is to optimize the pulse plating process using mathematical models. The traditional electronic industry uses a chemical bath with additives to make the through-hole plating on printed circuit boards. The pulse plating process can make the through plating without the additives and even improve the quality of the copper. So there is both solution to a environmental problem and a quality problem Based on the measurements from plated printed circuit boards the mathematical model is used find the optimal pulse parameters. In this project there is used artificial neural nets to solve the problem. With the final model it should be possible to "feed" the neural net with a CAD-design. Based on the design and the "knowledge" of the neural net it will be possible to compute the optimal pulse parameters.

Object-Oriented Framework for Large Scale Air Pollution Models

Department of Informatics and Mathematical Modeling

Period: 01/02/1998 → 14/12/2001
Number of participants: 5
Phd Student:
Antonov, Anton Antonov (Intern)
Main Supervisor:
Thomsen, Per Grove (Intern)
Examiner:
Meyer, Stefan (Intern)
Geernaert, Gerald (Ekstern)
Georgiev, Krassimir Todorov (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskerakademiets Samfinansier
Project: PhD
Ph.D. Project: Pedro Hoejen Soerensen: Statistical Analysis of Dynamical Brain Scans
This project concerns basic research in spatio-temporal modelling of functional magnetic resonance images. Methods for identification of significant change in image sequences will be developed and applied to neuroimaging.

Department of Informatics and Mathematical Modeling
Period: 01/02/1998 → 31/01/2001
Number of participants: 3
Project participant:
Højen-Sørensen, Pedro (Intern)
Larsen, Jan (Intern)

Project Manager, organisational:
Hansen, Lars Kai (Intern)

Number of participants: 7
Phd Student:
Højen-Sørensen, Pedro (Intern)
Supervisor:
Larsen, Jan (Intern)
Rasmussen, Carl Edward (Intern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Larsen, Rasmus Werner (Intern)
Kappen, Hilbert Johan (Ekstern)
Nielsen, Mads (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

Utilization of prior information i bio-assays
The aim of the project is to investigate and develop operational methods for potency assessments by bioassays that take prior knowledge from previous assessments into account.

Department of Informatics and Mathematical Modeling

Statens Serum Institut
Period: 01/02/1998 → 31/07/2000
Number of participants: 1
Project Manager, organisational:
Thyregod, Poul (Intern)

Villum Kann Rasmussen
Department of Mathematics
Period: 28/01/1998 → 31/10/2010
Number of participants: 1
Project participant:
Bendsøe, Martin P. (Intern)

Financing sources
Source: Gaver, Private danske Fonde
Name of research programme: Gaver, Private danske Fonde
Amount: 1,000,000.00 Danish Kroner
ADAPTIVE TOOLS FOR SHARED VIRTUAL ENVIRONMENTS under

Fully immersive virtual environments, while proven useful in many specialized contexts still suffer from relatively high costs and complexity. In this task we will use and expand the already existing VR installations for experiments on immersive multi-user virtual environments. VRML - Virtual Reality Modeling Language - a Web standard which allows interactive access to low-end, but platform independent, hyperlinked virtual environments is a promising candidate for standard workplace VR. We hypothesise that a multi-user interactive virtual environment will be a productive platform for communication of complex data, models, products and organizations. Such environments can be realised on high-end graphics platforms, providing immersion at high speeds in realistic scenery, or alternatively on generic platforms based on Web standards, with emphasis on interaction between geographically remote users in spatial hypertexts. Further we hypothesize that life in complex multiuser environments will meet a number of basic challenges relating to navigation, communication and physical comfort, challenges that are best overcome with the assistance of adaptive software agents.

Cognitive Systems

Department of Informatics and Mathematical Modeling

Aarhus University
Period: 01/01/1998 → 31/12/2001
Number of participants: 6
Project participant:
Larsen, Jan (Intern)
Kolenda, Thomas (Intern)
Christiansen, Torben (Intern)
Christensen, Niels Jørgen (Intern)
Project Manager, organisational:
Hansen, Lars Kai (Intern)
Heøck, Jens (Ekstern)

Dynamic modelling of Energy Systems

Department of Informatics and Mathematical Modeling
Period: 01/01/1998 → 03/12/2001
Number of participants: 5
Phd Student:
Andersen, Klaus Kaae (Intern)
Main Supervisor:
Madsen, Henrik (Intern)
Examiner:
Spliid, Henrik (Intern)
Bidstrup, Niels (Intern)
Lebrun, Jean (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-lønnet stipendie
Project: PhD

ESGIs - European Study Groups with Industry
ESGIs are workshops where mathematicians meet with industry to address problems of a mathematical nature related to production or development

Department of Mathematics
Period: 01/01/1998 → 31/12/2000
Number of participants: 1
Project Manager, organisational:
Hjorth, Poul G. (Intern)
Project
FMERail (ESPRIT Project EP26538)

This dissemination project aims at promoting the adoption of formal methods in the railway domain. The approach of the project is to arrange a series of workshops to show how different formal method technologies can be applied to railway problems.

Department of Information Technology
Department of Informatics and Mathematical Modeling
Instituttet for Anvendt Datateknik
TERMA Elektronik A/S
Formal Systems (Europe) Ltd.
Steria Méditerranée
Period: 01/01/1998 → 30/09/1999
Number of participants: 3
Project participant:
Bjørner, Dines (Intern)
Haxthausen, Anne Elisabeth (Intern)
Project Manager, organisational:
Hansen, Bo Stig (Intern)

Financing sources
Source: Overhead/overskud
Name of research programme: Overhead/overskud
Amount: 201,000.00 Danish Kroner

Hierarchical modelling of Bioassays

ph.d. project financed by the Danish Research Academy and Statens Serum Institut (SSI). The purpose of the project is to assess statistical models for incorporating additional information from previous assays into the analysis of bioassays used for potency estimation of batches of vaccine.

Department of Informatics and Mathematical Modeling
Period: 01/01/1998 → 31/12/2002
Number of participants: 2
Project participant:
Rehm, Dorte (Intern)
Project Manager, organisational:
Thyregod, Poul (Intern)

Laplacian Processes on Submanifolds

The Laplacian controls a variety of very natural phenomena ranging from heat diffusion to volume growth. It is the purpose of this project to show precise bounds for specific values of measures such as the mean exit time for Brownian motion and isoperimetric inequalities for well chosen subsets of the submanifolds under consideration. The geometric structures under consideration are minimal (or close to minimal) submanifolds and minimal (or close to minimal) metric graphs. The bounds alluded to are obtained via comparison with corresponding values in constant curvature spaces and in other tailor-made warped product spaces.

Department of Mathematics
Period: 01/01/1998 → 01/01/2020
Number of participants: 2
Project participant:
Markvorsen, Steen (Intern)
Palmer, Vicente (Ekstern)

Financing sources
Source: Forskningsrådene - SNF
Name of research programme: Forskningsrådene - STVF
Amount: 30,000.00 Danish Kroner
Modelling and Fairing of Ship Hulls

If one consider the hull of modern commercial vessel, then 90% of the hull is quite simple. The midship section is more or less a simple cylinder; but the bulbous bow and the stern with the propeller bossing has a very complex geometry and the transition from the simple cylindrical shape to the complex double curved shapes at the bow and stern gives the designer many problems. It also makes the use of ordinary B-spline or NURBS surfaces difficult. In the project we propose to use a generalization of NURBS-surfaces by Frank Weller to model ship hulls. As an other part of the project we want to replace the tedious manual fairing of the ship hull by an automated process which minimizes a suitable chosen fairness measure. The surface fairness measure is derived by demanding that all the planar intersection curves shall have a small curvature variation.

Department of Mathematics

Department of Naval Architecture and Offshore Engineering

Odense Staalskibsværft
Period: 01/01/1998 → …
Number of participants: 4
Project participant:
Ungstrup, Michael (Intern)
Baatrup, Jan (Intern)
Ecklon, Erling (Ekstern)
Project Manager, organisational:
Gravesen, Jens (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 900,000.00 Danish Kroner
Project

Multivariat kalibrering af kemiske sensorer

Department of Informatics and Mathematical Modeling
Period: 01/01/1998 → 28/09/2001
Number of participants: 7
Phd Student:
Øjelund, Henrik (Intern)
Supervisor:
Steen-Pedersen, Jørgen (Ekstern)
Thyregod, Poul (Intern)
Main Supervisor:
Madsen, Henrik (Intern)
Examiner:
Hansen, Lars Kai (Intern)
Olsen, Eli Vibeke (Ekstern)
Sundberg, Rolf (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Erhvervsforskerordningen
Project: PhD

Optimal Topology Design of Discrete Structures Resisting Degradation Effects

In this project we treat the problem of finding the optimal topology of a truss, so that stiffness after degradation is maximized. It is shown that for the problem setting at hand, the optimal topology has uniform relative degradation in all bars and the topology is unchanged from the topology for a truss not undergoing degradation. As is well known such a design can be realized as a fully stressed, statically determinate truss.

Department of Mathematics
University of Erlangen-Nuremberg
PARELLELIZATION OF THE VEHICLE ROUTING PROBLEM WITH TIME WINDOWS

Department of Informatics and Mathematical Modeling
Period: 01/01/1998 → 30/09/1999
Number of participants: 2
Phd Student:
Larsen, Jesper (Intern)
Main Supervisor:
Clausen, Jens (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering
Project: PhD

Real-Time Multimedia (RTMM)
This project is part of the Distributed Multimedia project within the framework of the Danish Research Councils' Center for Multimedia. The aim is to investigate technical aspects of multi-user distributed multimedia systems, especially for teaching use.
Department of Information Technology
Department of Informatics and Mathematical Modeling
Department of Telecommunication
Department of Photonics Engineering
Period: 01/01/1998 → 31/12/2001
Number of participants: 3
Project participant:
Løvengreen, Hans Henrik (Intern)
Pedersen, Steen (Intern)
Project Manager, organisational:
Sharp, Robin (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 1,554,000.00 Danish Kroner

Virtual Seminar Room; Audio
Project No. 1255. The aim of the project is the development of a robust speech acquisition system for a Virtual Seminar Room application. The work has been concentrated on the establishment of a multimicrophone, amplifier, signal processor, and loudspeaker system, which allows for research in algorithms for speech localization, noise reduction and signal separation. There has been work on robust adaptive beamforming, where an initial combined beamforming and room simulation model, has been developed in Matlab. Furthermore there has been work on acoustic echo cancellation. This project is a part of a cooperation on the design of a Virtual Seminar Room, and is concentrated on the audio part. The project is carried out in cooperation with the DTU Departments COM, IT and TELE, and in cooperation with the Department of Information and Media Science at Århus University.
Department of Informatics and Mathematical Modeling
Department of Photonics Engineering
Department of Information Technology
Department of Telecommunication
Period: 01/01/1998 → 31/12/2001
Number of participants: 9
Project participant:
Hansen, Peter Søren Kirk (Intern)
Hansen, Steffen Duus (Intern)
Danielsen, Per Lander (Intern)
Gram, Christian (Intern)
Pedersen, Steen (Intern)
Sharp, Robin (Intern)
Forchhammer, Søren (Intern)
Jensen, Ole Riis (Intern)
Project Manager, organisational:
Sørensen, John Aasted (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 425,000.00 Danish Kroner
Project

Restructuring of Electronics Studies in Lithuania
TEMPUS Joint European Program (JEP-12398-97) Project web page: http://www.es.oersted.dtu.dk/~el/jep12398.htm
Department of Information Technology
Department of Informatics and Mathematical Modeling
Kaunas University of Technology
Vilnius Gediminas Technical University
City University London
Karlsruher Institut für Technologie
Period: 15/12/1997 → 14/03/2001
Number of participants: 1
Project Manager, organisational:
Lindberg, Erik (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 2,552,144.00 Danish Kroner
Project

Anvendelse af apriori viden i bioassays
Department of Informatics and Mathematical Modeling
Period: 01/12/1997 → 22/09/2004
Number of participants: 6
Phd Student:
Rehm, Dorte (Intern)
Supervisor:
Hasløv, Kaare Robert (Ekstern)
Main Supervisor:
Thyregod, Poul (Intern)
Examiner:
Rootzén, Helle (Intern)
Vølund, Aage (Ekstern)
Windfeld, Kristian (Ekstern)
Center for Microinstruments (CfM)
CfM is a collaboration between the Department of Information Technology and the Microelectronics Centre, and is headed by professor Jørgen Staunstrup. CfM is established with a donation from the Thomas B. Thriges fund, while an associated graduate school financially supported by the Research Academy. CfM is supported by a range of Danish companies. The research activities of CfM focus on: - Computer Aided Engineering for micromechanical transducers - Smart transducers: design of sensors and actuators with integrated signal processing - Low power design for digital signal processors The tools and technologies developed within CfM are demonstrated in two main applications: - system level design of transducers, interfaces and digital circuit processors for hearing aids, and - topology optimized microactuators.

Department of Micro- and Nanotechnology
Department of Information Technology
Department of Informatics and Mathematical Modeling

Michigan Microsensor Inc.
Period: 01/12/1997 → 01/01/2003
Number of participants: 9
Project participant:
Hansen, Ole (Intern)
Jonsmann, Jacques (Intern)
Vestergaard, Ras Kaas (Intern)
Najafi, Khalil (Intern)
Ginnerup, Morten (Intern)
Crary, Selden (Ekstern)
Staunstrup, Jørgen (Intern)
Sparsø, Jens (Intern)
Project Manager, organisational:
Bouwstra, Siebe (Intern)

Elforbrugsmodeller for ELKRAFT-omraadet

Department of Informatics and Mathematical Modeling

Elkraft A.m.b.A.
Period: 01/12/1997 → 01/03/1998
Number of participants: 2
Project participant:
Nielsen, Henrik Aalborg (Intern)
Project Manager, organisational:
Madsen, Henrik (Intern)

Elforbrugsmodeller for ELKRAFT-omraadet

Department of Informatics and Mathematical Modeling

Elkraft A.m.b.A.
Period: 01/12/1997 → 01/03/1998
Number of participants: 2
Project participant:
Nielsen, Henrik Aalborg (Intern)
Project Manager, organisational:
Madsen, Henrik (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Kandidatstipendium ansat på DT
Project: PhD

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 10,000,000.00 Danish Kroner
Project

Elforbrugsmodeller for ELKRAFT-omraadet

Department of Informatics and Mathematical Modeling

Elkraft A.m.b.A.
Period: 01/12/1997 → 01/03/1998
Number of participants: 2
Project participant:
Nielsen, Henrik Aalborg (Intern)
Project Manager, organisational:
Madsen, Henrik (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
High-level program design of telecommunication software

Department of Informatics and Mathematical Modeling
Period: 01/12/1997 → 01/02/2001
Number of participants: 2
Phd Student:
Hoffmann, Torben (Intern)
Main Supervisor:
Hansen, Michael Reichhardt (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Erhvervsforskerordningen
Project: PhD

History and Philosophy of Mathematics
The project examines historical and philosophical aspects of geometry.

Department of Mathematics
Period: 01/11/1997 → ...
Number of participants: 1
Project Manager, organisational:
Hansen, Vagn Lundsgaard (Intern)

EUROPRACITCE (II)
EUROPRACITCE continued giving service in 5 important microelectronics areas. One important area relevant to analog design is Training and Best Practice Service (TBPS) headed by CIE and responsible for training in all 5 areas. TBPS has made a large investigation of industrial need for analog training. The result was that analog is increasing. 1,200 courses were offered. A change towards industry was made.

Department of Information Technology
Department of Informatics and Mathematical Modeling
TWI
COREP
CNM
CNFM
Period: 01/10/1997 → 30/09/1999
Number of participants: 5
Project participant:
Andersen, Anders C. (Intern)
Høvring, Hanne Nielsen (Intern)
Berthelsen, Vibeke (Intern)
Elmelund, Lene P. (Intern)
Project Manager, organisational:
Olesen, Ole (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 1,612,500.00 Danish Kroner

Grey-box identification
In the modelling of dynamic systems several approaches exist. For the so-called black box approach the modelling is based solely on measurements obtained for the actual system, and any prior information about the system is not used. The opposite approach is used in the white box or physical approach where the model is formulated solely on prior
knowledge. In the project methods for combining the two approaches are developed, and such methods are called grey-box methods. The methods are based on Bayesian statistics. Typically the structure of the models are formulated as stochastic differential equations and the parameters are estimated using available data. The modelling approach has been tested with great success on many physical and technical systems.

Department of Informatics and Mathematical Modeling

John Hopkins University

Period: 01/10/1997 → 01/11/1998
Number of participants: 2
Project participant:
Sadegh, Payman (Intern)
Project Manager, organisational:
Madsen, Henrik (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 80,000.00 Danish Kroner
Project

Objektorienteret modellering af dynamiske systemer

Department of Informatics and Mathematical Modeling

Period: 01/10/1997 → 11/09/2002
Number of participants: 6
Phd Student:
Poulsen, Mikael Zebbelin (Intern)
Supervisor:
Houbak, Niels (Intern)
Main Supervisor:
Thomsen, Per Grove (Intern)
Examiner:
Madsen, Henrik (Ekstern)
Marthinsen, Arne (Ekstern)
Söderlind, Gustaf (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-Su Stipendium, Eksperiment
Project: PhD

Center for IT-tools in the Energy Sector
In this center models for the energy sector is constructed and tested. The purpose is simulation and to be able to develop intelligent components for heating systems. Under this center some other projects are established.

Department of Informatics and Mathematical Modeling

Danfoss A/S
Danish Technological Institute
Grundfos A/S
APV

Period: 01/09/1997 → 31/08/2001
Number of participants: 2
Project participant:
Andersen, Klaus Kaae (Intern)
Project Manager, organisational:
Madsen, Henrik (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Dynamics of Plane Euler Elastica

The configuration space of plane Euler elastica is a two dimensional space with a simple potential function. The associated dynamical system is studied in order to describe the movement of the free end.

Department of Mathematics
Period: 01/09/1997 → …
Number of participants: 5
Project participant:
Brøns, Morten (Intern)
Hjorth, Poul G. (Intern)
Markvorsen, Steen (Intern)
Sinclair, Robert (Intern)
Project Manager, organisational:
Gravesen, Jens (Intern)

Holomorf dynamik og Herman-ringe

Department of Mathematics
Period: 01/09/1997 → 30/03/2001
Number of participants: 6
Phd Student:
Henriksen, Christian (Intern)
Supervisor:
Petersen, Carsten Lunde (Intern)
Main Supervisor:
Branner, Bodil (Intern)
Examiner:
Hjorth, Poul G. (Intern)
Astala, Kari (Ekstern)
Douady, Adrien (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-Su Stipendium, Eksperiment
Project: PhD

Holomorphic Dynamics, Herman Rings.

Geometry of (possibly) degenerated Herman Rings. Geometry of the set of points in parameter space corresponding to maps with a Herman ring exhibiting certain characteristics such as rotation number, modulus and wringing.

Department of Mathematics
Period: 01/09/1997 → 31/08/2000
Number of participants: 3
Project participant:
Henriksen, Christian (Intern)
Petersen, Carsten Lunde (Ekstern)
Project Manager, organisational:
Branner, Bodil (Intern)

Hæmodynamisk modellering af hjertet

Department of Informatics and Mathematical Modeling
Period: 01/08/1997 → 30/11/2001
Number of participants: 7
Phd Student:
Modellering og styring af sprøjtestøbeprocess

Project no.: 1247 Ph.D. project: ATV Ph.D. student: Peter Thyregod


Department of Informatics and Mathematical Modeling

Novo Nordisk A/S
Period: 01/08/1997 → 31/07/2000
Number of participants: 3
Project participant:
Spliid, Henrik (Intern)
Thyregod, Peter (Intern)

Project Manager, organisational:
Madsen, Henrik (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Erhvervsforskerordningen
Project: PhD

Modellering og styring af sprøjtestøbeprocess

Department of Informatics and Mathematical Modeling

Period: 01/08/1997 → 19/03/2001
Number of participants: 7
PhD Student:
Thyregod, Peter (Intern)
Supervisor:
Melgaard, Henrik (Intern)
Spliid, Henrik (Intern)
Main Supervisor:
Madsen, Henrik (Intern)
Examiner:
Rootzén, Helle (Intern)
Bisgaard, Søren (Ekstern)
Olsen, Klaus Juel (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Erhvervsforskerordningen
Project: PhD
Optimal correction of Scanning Probe Microscopy Images

Department of Mathematics
Period: 01/08/1997 → 09/02/2001
Number of participants: 3
PhD Student:
Dirscherl, Kai (Intern)
Main Supervisor:
Sørensen, Mads Peter (Intern)
Examiner:
Mørch, Knud Aage (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Ef-Finansieret, Stipen.-SU
Project: PhD

Optimal Correction of Scanning Probe Microscopy Images. The project concerns improvement of calibration and correct images from a Scanning Probe Microscope (SPM). The SPM consists of a piezo tube on which the sample is mounted. The tube moves the sample underneath an ultrafine tip. The vertical movement of the tip is registered by a laser beam during scanning across the sample surface in either contact mode or tapping mode. From the vertical movement of the tip an image of the sample surface is recorded. The goal is to provide a better understanding of the movement and control of SPMs through mathematical modelling and to investigate the tip-sample interaction and its influence on the scanned image.

Department of Informatics and Mathematical Modeling
Period: 01/08/1997 → 31/07/2000
Number of participants: 1
Project Manager, organisational:
Sørensen, Mads Peter (Intern)

Phosphor diffusion i float zone silicium krystal dyrkning

Department of Mathematics
Period: 01/08/1997 → …
Number of participants: 4
PhD Student:
Larsen, Theis Leth (Intern)
Supervisor:
Hansen, Ole (Intern)
Main Supervisor:
Sørensen, Mads Peter (Intern)
Examiner:
Lynov, Jens-Peter (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Erhvervsforskerordningen
Project: PhD

Simulation of Float-Zone Silicon Single Crystal Growth.

Single crystal silicon is the basic building material for nearly all semiconductor electronics and is therefore an important raw material for the electronics industry. Singlecrystalline silicon rods of very high purity can be manufactured by the Float Zone technique, in which a polycrystalline rod is molten locally using a radio frequency electromagnetic field induced by a narrow coil surrounding the rod. The molten silicon solidifies into a single crystal, which is sliced into thin wafers. Mathematical modelling is employed as a tool for investigating the Float Zone process. Of special interest is the dynamics of the molten zone, crucial for the stability of the process and the quality of the produced crystal. The computational work includes solving the Navier-Stokes equations for the molten silicon with a free surface moving boundary and with boundaries at which melting and solidification occur. The shape of the melt free surface is influenced by the AC electromagnetic field calculated from Maxwell's equations. Heat transfer from the free surface into the silicon melt is included together with buoyancy, gravitational, electromagnetic and surface tension forces.
Three-dimensional topology of the vortex breakdown

The vortex breakdown is the creation of a secondary flow structure around a vortex. Due to its occurrence in many flows in technology and nature, this is a very active research area. The present project is concerned with some recently discovered three-dimensional effects which have important bearing on experimental visualisation of the flow. The project attempts to use bifurcation theory to qualitatively explain and predict the experimental results.

Graduate School in Microelectronics

Department of Information Technology

Department of Micro- and Nanotechnology

Department of Informatics and Mathematical Modeling

Multiple model approaches to modelling and control

EU Training and Mobility of Researchers financed research project
Period: 01/05/1997 → 30/04/1999
Number of participants: 1
Project Manager, organisational:
Murray-Smith, Roderick (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 400,000.00 Danish Kroner

Project

TDM prestudy
A prestudy related to the comparison of signal strength in mobile communications was performed for the Mobile Division of Tele Danmark.

Department of Informatics and Mathematical Modeling
Period: 02/04/1997 → 15/05/1997
Number of participants: 3
Project participant:
Thyregod, Poul (Intern)
Larsen, Poul B. (Ekstern)
Project Manager, organisational:
Nielsen, Bo Friis (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 20,000.00 Danish Kroner

Project

Combined physical and statistical on-line prediction of wind power from wind farms.
The purpose is to develop methods for embedding physical and statistical information in prediction models for long term forecasting of wind power in wind mill farms.

Department of Informatics and Mathematical Modeling
Risø National Laboratory for Sustainable Energy
Period: 01/04/1997 → 31/03/2000
Number of participants: 3
Project participant:
Joensen, Alfred K. (Intern)
Nielsen, Torben Skov (Intern)
Project Manager, organisational:
Madsen, Henrik (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 55,162.00 Danish Kroner

Project

Kombineret fysik og statsisk on-line forudsigelse af produktion fra vindmølleparker
Department of Informatics and Mathematical Modeling
Period: 01/04/1997 → 20/05/2003
Number of participants: 6
Phd Student:
Joensen, Alfred K. (Intern)
Supervisor:
Landberg, Lars (Intern)
Main Supervisor:
Madsen, Henrik (Intern)
**Multivariate Calibration in Optical Sensors**

The purpose is to develop statistical methods for robust, and efficient calibration of optical sensors used in waste water treatment plants. Several regularization methods and non-parametric methods will be considered. Also robust techniques are investigated.

Department of Informatics and Mathematical Modeling

Danfoss A/S

Period: 01/04/1997 → 31/05/2001

Number of participants: 3

Project participant:

Thyregod, Poul (Intern)

Øjelund, Henrik (Intern)

Project Manager, organisational:

Madsen, Henrik (Intern)

**Financing sources**

Source: Internal funding (public)

Name of research programme: Risø (Ln)

Project: PhD

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**Flat surfaces in 3-space and their boundaries.**

A surface in 3-space is called flat if its Gaussian curvature is identically equal to zero. The isotopy classes of flat compact surfaces with non-vanishing boundary have, in this project, been proven to be in one-one correspondence with the isotopy classes of ordinary compact surfaces with non-vanishing boundary in 3-space. The exact statement is: In 3-space, any compact surface with non-vanishing boundary is isotopic to a flat surface and two such flat surfaces are isotopic through ordinary surfaces if and only if they are isotopic through flat surfaces. Some necessary conditions and one sufficient condition for a knot or link in 3-space to bound a flat surface are found. Most of the obtained results are analogous to recent results on positive curvature surfaces and their boundaries obtained by H. Gluck, L.-H. Pan, and M. Ghomi. Long sight goals of this project are to give a necessary and sufficient condition for a knot or link to bound a flat surface and to
determine if analogous results holds for negative curvature surfaces in 3-space.

Department of Mathematics  
Period: 01/03/1997 → 31/01/1999  
Number of participants: 3  
Project participant:  
Hansen, Vagn Lundsgaard (Intern)  
Markvorsen, Steen (Intern)  
Røgen, Peter (Intern)  

virtual reality: Visualisation and modelling  
Department of Informatics and Mathematical Modeling  
Period: 01/02/1997 → 06/03/2003  
Number of participants: 5  
Phd Student:  
Bormann, Karsten (Intern)  
Main Supervisor:  
Christensen, Niels Jørgen (Intern)  
Examiner:  
Henriksen, Knud (Ekstern)  
Carlsten, Niels V. (Ekstern)  
Takala, Tapio (Ekstern)  

Financing sources  
Source: Internal funding (public)  
Name of research programme: DTU-Su Stipendium, Ekstephen  
Project: PhD

Waveletanalyse af systemer med fordelt parameter  
Department of Mathematics  
Period: 01/02/1997 → 01/08/1997  
Number of participants: 2  
Phd Student:  
Andersen, Kennet (Intern)  
Main Supervisor:  
Pedersen, Michael (Intern)  

Financing sources  
Source: Internal funding (public)  
Name of research programme: DTU-Su Stipendium, Ekstephen  
Project: PhD

1227 Industrial Center for Surface Analysis, Micro Analysis and Image Analysis  
Project nr. 1227. The objective is to provide methods for visually analysing surfaces acquired by microscopy. This includes development and implementation of methods to assist and do the actual measurements and characterisation.

Department of Informatics and Mathematical Modeling  
Danish Technological Institute  
Danaklon A/S  
Obtec A/S  
Bang & Olufsen A/S  
Elsam A/S  
Ferroperm A/S
Adiabatic Invariants and Equipartition
The collisional relaxation of a 1-D gas of molecules with one internal degree of freedom is studied, in particular with respect to the role of a many-particle adiabatic invariant that exists when the timescale for the internal degrees of freedom is much shorter than the collisional timescale.

Avancerede trackingssensorer
Samarbøde med DELTA LYS & OPTIK, FORCE og en række virksomheder

ConFront
To achieve a higher level of integration, the project proposes a novel approach to the design strategy. Rather than making specifications based on a purely architectural approach, the project will use a concurrent approach, where circuit designers and architecture designers cooperate on the design and specifications. This will allow more circuit issues to be included in the overall architecture, leading to an architecture with circuit blocks suited for full integration. The higher level of integration will be achieved by combining analog and digital signal processing in the front-end.
**Financing sources**
Source: Unknown
Name of research programme: Ukendt
Amount: 522,000.00 Danish Kroner
Source: Unknown
Name of research programme: Ukendt
Amount: 400,000.00 Danish Kroner
Source: Unknown
Name of research programme: Ukendt
Amount: 450,000.00 Danish Kroner

**Elastic Wave Propagation in Anisotropic, Inhomogenous Materials_ Application to Ultrasonic NDT**

Department of Mathematics
Period: 01/01/1997 → 28/04/2000
Number of participants: 3
Phd Student:
**Halkjær, Søren (Intern)**
Supervisor:
**Langbein, Wolfgang Werner (Intern)**
Main Supervisor:
**Sørensen, Mads Peter (Intern)**

**Financing sources**
Source: Internal funding (public)
Name of research programme: Erhvervsforskerordningen
Project: PhD

**Graduate School in Microelectronics**
The Graduate School in Microelectronics was started in 1997 and its aim was to enhance (quantitatively and qualitatively) the Ph.d.-education in the area of Microelectronics. The Graduate School was funded by the Danish Research Training Council (in Danish: Forskeruddannelsesrådet) with 1 M kr. per year. The graduate school has co-funded summer schools, visiting professors and Ph.d.-scholarships. In total 8 Ph.d.-projects has been funded jointly by the Graduate School, private companies and research projects. The projects are hosted by MIC, Ørsted*DTU and IMM and the companies involved are: B-K Medical, Dicon, GN ReSound, NOKIA, Oticon, Sensor Technology Center and SonionMEMS.

Department of Information Technology
Department of Informatics and Mathematical Modeling
Department of Electrical Engineering
Department of Micro- and Nanotechnology
Period: 01/01/1997 → 31/12/2001
Number of participants: 15
Project participant:
**Paker, Ozgun (Intern)**
Larsen, Ken (Intern)
Holten-Lund, Hans Erik (Intern)
Pedersen, Steen (Intern)
Madsen, Jan (Intern)
Jensen, Jørgen Arendt (Intern)
Tomov, Borislav Gueorguiev (Intern)
Andreani, Pietro (Intern)
Wang, Xiaoyan (Intern)
Hansen, Ole (Intern)
Financing sources
Source: Unknown
Name of research programme: *Ukendt*
Amount: 1,000,000.00 Danish Kroner

Guest List at IMM - 1997.
Mindaugas Radziunas. Dept. of dif. equat. and numer. analysis. Vilnius University, Math. faculty (14/1/97 - 1/5/97)
Frank Gohmann. Physikalisches Institut der Universitat Beyreuth. (14/1/97 - 14/2/97) (14/10/97 - 14/12/97)
Alexander V. Zolotaryuk. Bogolyubov Inst. for Theoretical Physics of National Academy of Science, Ukraine. (14/1/97 - 14/2/97) (14/10/97 - 14/12/97)
Yuri Gaididai. Inst. for Theoretical Physics, Kiev, Ukraine. (2/3/97 - 5/6/97) (8/10/97 - 22/10/97)
Bintong Chen. USA (10/7/97 - Juni 98)
Marcel Neuts. Univ. of Arizona (15/8/97 - 15/11/97)
Salah Mahmoud Hanafi. (1/9/97 - 31/12/97)
Jouri Gladychov. (15/9/97 - 31/1/97)
Antanas Ziliaskas Jens Litzenburger. Karlsruhe (23/10/97 - 20/12/97)
Chris Eilbeck. Dept. of Mathematics Edinburgh. (3/10/97 - 7/12/97)
Oliver Froment. SNCF, Direction de la Recherche. Paris. France. (3/11/97 - 17/12/97)
Jean Guy Caputo. Laboratoire de Mathematiques. INSA de Rouen. (23/11/97 - 7/12/97)

**Helicity of Infinite-dimensional Hamiltonian Systems**
For a finite-dimensional Hamiltonian system, the Hamiltonian Helicity is defined as the integral over a 3-volume of the natural 3-form associated with the system. It is of interest to establish the mathematical connection to the helicity invariant associated with infinite dimensional systems (e.g., ideal fluids).

**Modelling Ultrasound Wave Propagation in Anisotropic and Inhomogeneous Materials.**
In nondestructive testing ultrasound waves are an important tool for inspection of voids and faults in materials. The method is well established for isotropic and homogeneous materials whereas cases with anisotropy and inhomogeneity lead to difficulties in the design of inspection procedures and interpretations of inspection results. The difficulties arise from redirection and/or bending of the sound wave propagation in an unknown manner. In order to investigate the influence of anisotropy and inhomogeneity on the sound wave propagation we have implemented the elastic wave equations using Elasto Dynamics Finite Integration Technique (EFIT).

**Modelling Ultrasound Wave Propagation in Anisotropic and Inhomogeneous Materials.**
In nondestructive testing ultrasound waves are an important tool for inspection of voids and faults in materials. The method is well established for isotropic and homogeneous materials whereas cases with anisotropy and inhomogeneity lead to difficulties in the design of inspection procedures and interpretations of inspection results. The difficulties arise from redirection and/or bending of the sound wave propagation in an unknown manner. In order to investigate the influence of anisotropy and inhomogeneity on the sound wave propagation we have implemented the elastic wave equations using Elasto Dynamics Finite Integration Technique (EFIT).
Molecular and biomolecular dynamics

Department of Informatics and Mathematical Modeling
Period: 01/01/1997 → …
Number of participants: 32
Project participant:
Trandum, Jens (Intern)
Scott, Alwyn C. (Intern)
Rasmussen, Kim (Intern)
Ellinas, D. (Ekstern)
Gaididei, Yu. B. (Ekstern)
Enolskii, V. Z. (Ekstern)
Savin, A. (Ekstern)
Zolotaryuk, A. (Ekstern)
Zolotaryuk, Y. (Ekstern)
Johansson, Magnus (Ekstern)
Lomdahl, P. S. (Ekstern)
Muto, V. (Ekstern)
Bullough, R. K. (Ekstern)
Eilbeck, J. C. (Ekstern)
Cruzeiro-Hansson, L. (Ekstern)
Kuznetsov, V. B. (Ekstern)
Rionero, Salvatore (Ekstern)
Salerno, M. (Ekstern)
Careri, G. (Ekstern)
Zundel, G. (Ekstern)
Hennig, D. (Ekstern)
Gabriel, H. (Ekstern)
Kuprievich, V. A. (Ekstern)
Brizhek, L. (Ekstern)
Gilhoej, Henriette (Ekstern)
Mouritsen, O. (Ekstern)
Olsen, O. H. (Ekstern)
Peyrard, M. (Ekstern)
Collins, M. (Ekstern)
Tsironis, G. P. (Ekstern)
Tuszynski, J. A. (Ekstern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 100,000.00 Danish Kroner
Source: Unknown
Name of research programme: Ukendt
Amount: 25,000.00 Danish Kroner
Non-linear stochastic models of molecular crystals

Department of Informatics and Mathematical Modeling
Period: 01/01/1997 → …
Number of participants: 24
Project participant:
Scott, Alwyn C. (Intern)
Rasmussen, Kim (Intern)
Sørensen, Mads Peter (Intern)
Gaididei, Yuri B. (Ekstern)
Maine, David Usero (Ekstern)
Eilbeck, J.C. (Ekstern)
Schmidt, Michel Roguelin (Ekstern)
Rasmussen, Jens Juul (Ekstern)
Ramanujam, P.S. (Ekstern)
Tromborg, Bjarne (Ekstern)
Pagano, S. (Ekstern)
Felice, Arco (Ekstern)
Vitiello, G. (Ekstern)
Mezentsev, V.K. (Ekstern)
Tuntsyn, S. (Ekstern)
Peyrard, M. (Ekstern)
Kuznetsov, E.A. (Ekstern)
Zakharov, V.E. (Ekstern)
Bang, Ole (Ekstern)
Konotop, V. (Ekstern)
Tusszynski, J.A. (Ekstern)
Joergensen, M.F. (Ekstern)
Moebius, D. (Ekstern)
Project Manager, organisational:
Christiansen, Peter Leth (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 100,000.00 Danish Kroner
Source: Unknown
Name of research programme: Ukendt
Amount: 25,000.00 Danish Kroner
Project

Object measurement. Project no.: 1215, Ph.D-student Claus Gramkow.
Project no.: 1215 Financed by: ATV

Department of Informatics and Mathematical Modeling
Period: 01/01/1997 → 31/12/1999
Number of participants: 2
Project participant:
Gramkow, Claus (Intern)
Project Manager, organisational:
Ersbøll, Bjarne Kjær (Intern)
Principal normal indicatrix of a closed space curves.

Considering the differential geometry of (closed) space curves it is usually assumed that curvature never vanishes. A natural extension of the Frenet Apparatus, that allows curvature to take both signs as long a curvature and torsion do not vanish simultaneously, is eg. used by W. Fenchel in 1950. At that time it was known that the principal normal indicatrix of a closed space curve fulfilling the Fenchel condition has integrated geodesic curvature equal to an integral multiple of 2*Pi. In 1950 W. Fenchel gave a reformulation of the inverse problem in terms of the convex hulls of a family of closed curves on the unit 2-sphere. By a more resent theorem due to J. Weiner (1991), which also is proven curve-theoreticly by B. Solomon (1996) it follows that the principal normal indicatrix of a closed space curve with non-vanishing curvature has integrated geodesic curvature zero and contains no sub arc with integrated geodesic curvature Pi. In this project it is proven that, when restricted to closed curves on the unit 2-sphere with integrated geodesic curvature zero that contains no sub arc with integrated geodesic curvature Pi, then the inverse problem formulated by W. Fenchel always has solutions, if one allows zero and negative curvature of space curves. Furthermore it is explained why this is not true if non-vanishing curvature is required. By giving examples of closed curves on the unit 2-sphere with integrated geodesic curvature 2*Pi*z, for any integer z, which are not a principal indicatrix of a closed space curve (even when allowing zero and negative curvature) the general answer to W. Fenchels question is found to be to the negative.
Superconducting elements and nonlinearity


Department of Informatics and Mathematical Modeling

Department of Mathematics

Period: 01/01/1997 → …

Number of participants: 27

Project participant:

Sørensen, Mads Peter (Intern)
Scott, Alwyn C. (Intern)
Caputo, Jean Guy (Intern)
Flytzanis, N. (Ekstern)
Kalosakas, G. (Ekstern)
Lazarides, Nikos (Ekstern)

Financing sources

Source: Unknown
Name of research programme: Ukendt
Amount: 100,000.00 Danish Kroner

Source: Unknown
Name of research programme: Ukendt
Amount: 25,000.00 Danish Kroner

The use of polarimetric SAR for the mapping and characterization of the natural environment

Department of Informatics and Mathematical Modeling
Topological Fluid Mechanics
The project is concerned with a qualitative description of flow patterns, mainly in two dimensions. The aim is to classify possible patterns and their bifurcations as external parameters are varied. The results are applied to viscous and Stokes flows and flows with different types of symmetry.

Department of Mathematics
Period: 01/01/1997 → ...
Number of participants: 2
Project participant:
Hartnack, Johan Nicolai (Intern)
Project Manager, organisational:
Brøns, Morten (Intern)
Project

Vision-baseret måling
Anvendelse af en kombination af et kamera og en computer som et avanceret måleinstrument har et enormt potentiale. Der er nu blevet hardwaremæssigt håndterbart at udføre sådanne målinger on-line på generelle platforme som f.eks. PC'ere. Udfordringen i at udnytte dette potentiale ligger på software-siden. Et standard farvekamera leverer ca. 30 MB/s, der måske skal omsættes til de 100B/s, der er relevante i den givne problemstilling. Resultatet skal endvidere være robust ikke kun over for målestøj, men også over for f.eks. ændringer i belysningen samt irrelevante objekter i billedfelter. Det er projektets formål at udvikle et softwaresystem, der implementerer vision-baseret måling til f.eks. produkt- og procesovervågning i industrien og til sikkerheds-/trygheds-overvågning.

Department of Informatics and Mathematical Modeling
Center for IT-forskning
7-Technologies
Period: 01/01/1997 → ...
Number of participants: 1
Project Manager, organisational:
Carstensen, Jens Michael (Intern)

Adaptive control of a cutting process.
This activity concerns development of a nonlinear adaptive controller for a cutting process. The objective is to control the feed rate such that it is optimized without exceeding the permitted maximum torque acting on the tool. Most control systems currently available are simple and follow conservative strategies. In the current project we pursue various nonlinear adaptive control strategies for high performance control of the process. The controllers are designed to perform well for arbitrary combinations of material, type of tool, tool wear, depth of cut, and tool speed. The project is carried out in...
collaboration with Division of Manufacturing Engineering, Luleå University of Technology. This division has at its disposal a machining center with modified control hardware which is used for practical experiments. A nonlinear adaptive controller has been designed and various tests and fine tunings have been carried out. Practical experiments have demonstrated a promising performance for cutting in aluminum. In the forthcoming year we will explore the performance of the controller for other tools and materials.

CICT

Department of Informatics and Mathematical Modeling

Department of Automation

Department of Electrical Engineering

Luleå University of Technology

Period: 05/12/1996 → 05/12/1997

Number of participants: 4

Project participant:

Nørgård, Peter Magnus (Intern)

Ravn, Ole (Intern)

Bäckström, Mikael (Ekstern)

Project Manager, organisational:

Poulsen, Niels Kjølstad (Intern)

Project

Consistency in Statistical Toxicity Testing

Ph.D. Project no. 1214 Financier: ATV Ph.D. Student: Helle Andersen Development of models for consistent statistical methods in toxicity testing in pre-clinical experiments in the pharmaceutical industry. The work is aiming at the construction of a knowledge database containing information about selection of mathematical models and for example possible transformations, outlier tests and other statistical procedures for given types of studies.

Department of Informatics and Mathematical Modeling

Period: 01/11/1996 → 30/10/1999

Number of participants: 2

Project participant:

Andersen, Helle (Intern)

Project Manager, organisational:

Spliid, Henrik (Intern)

Spatial models for the benthic communities Mytilus edulis and Posidonia oceanica and spatial estimation herof based on hydroacoustic measurement. Project no.:1250. Ph.D-student Per Settergren Sørensen

Project no.: 1250. Financed by: EU/DTU/VKI

Department of Informatics and Mathematical Modeling

Period: 01/11/1996 → 30/04/1999

Number of participants: 2

Project participant:

Sørensen, Per S. (Intern)

Project Manager, organisational:

Conradsen, Knut (Intern)

Statistical methods and models for standardized toxicological and safety pharmacological studies.

Project no.: 1214 Ph.D. project: ATV - Novo Nordisk A/S Ph.D. student: Helle Andersen During the last couple of years, a group of scientists at Novo Nordisk have developed a decision tree for the statistical analysis of toxicity data from studies with animals. Unfortunately the decision tree has been found to lead to inconsistencies as variables are often analyzed differently from study to study. Furthermore, it does not contain a test battery for the analysis of the dose-response relationship, or recommendations for the analysis of repeated measurements. An other shortcoming of the decision tree is that it does not contain recommendations for the statistical analysis of safety pharmacology data. My project has been initiated to overcome these problems. The purpose of the statistical work in the project is to evaluate existing basic experimental designs and matching statistical models in toxicological studies where statistical methodology has already been applied. The purpose of the statistical work is to establish a "knowledge data base" where experimental designs and empirical knowledge about biological variables determine the statistical model, and hence the statistical analysis. There is some empirical knowledge in the following areas (among others): - Transformation of data - Distribution of variables -
Statistical tests for outliers - Statistical tests for homogeneity of variance - Statistical analysis of single and correlated variables - Statistical considerations of repeated measurements on individual animals In this way, variables will be analyzed identically from study to study, i.e. the statistical method will be identical for the same variable independently of study. But at the same time, statistical methods will be established to spot abnormalities (outliers) which could indicate some (important) adverse biological response.

Department of Informatics and Mathematical Modeling
Period: 01/11/1996 → 31/10/1999
Number of participants: 1
Project Manager, organisational:
Andersen, Helle (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 36,175.00 Danish Kroner
Project

Statistiske metoder og modeller til analyse
Department of Informatics and Mathematical Modeling
Period: 01/11/1996 → 14/03/2000
Number of participants: 2
Phd Student:
Andersen, Helle (Intern)
Main Supervisor:
Spliid, Henrik (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Erhvervsforskerordningen
Project: PhD

Addition of Consistent Stress Criteria to Homogenized Materials with Optimal Distribution
Control of local stress constraints in topology optimization of continuum structures. The research aims at describing the way stress criteria may be added to the optimal distribution problem based on homogenized materials. Consistent stress criteria for the homogenized materials are enforced in order to limit the stress state in any point of the material. Solution aspects of these large scale problems are investigated.

Department of Mathematics
Period: 01/09/1996 → 31/08/1997
Number of participants: 2
Project participant:
Bendsøe, Martin P. (Intern)
Project Manager, organisational:
Duysinx, Pierre (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 175,000.00 Danish Kroner
Project

Deformable Templates Models. Project no.:1197, Ph.D-student Rune Fisker.
Project no.:1197 Financed by: DTU/Tranes Foundation

Department of Informatics and Mathematical Modeling
Period: 01/09/1996 → 01/09/2000
Number of participants: 2
Project participant:
Fisker, Rune (Intern)
Project Manager, organisational:
Conradsen, Knut (Intern)
Endelig-dimensionale dynamiske systemer i fluid mekanik

Department of Mathematics
Period: 01/09/1996 → 29/09/1999
Number of participants: 2
Phd Student:
Hartnack, Johan Nicolai (Intern)
Main Supervisor:
Brøns, Morten (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-Su Stipendium, Eksperiment
Project: PhD

Estimation in Stochastic Differential Equations

The purpose is to investigate and eventually develop methods for estimating embedded parameters in stochastic differential equations using discrete time data. We focus on models for describing the dynamics of interest rates.

Department of Informatics and Mathematical Modeling

Unibank
Period: 01/09/1996 → 31/08/1999
Number of participants: 2
Project participant:
Baadsgaard, Mikkel (Intern)
Project Manager, organisational:
Madsen, Henrik (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 81,075.00 Danish Kroner
Project

Estimation Techniques in Stochastic

Department of Informatics and Mathematical Modeling
Period: 01/09/1996 → 01/09/1999
Number of participants: 2
Phd Student:
Baadsgaard, Mikkel (Intern)
Main Supervisor:
Madsen, Henrik (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-Su Stipendium, Eksperiment
Project: PhD

Finite dimensional dynamics in fluid mechanics.

The project is concerned with topological fluid dynamics. That is the description and classification of flow patterns appearing in incompressible fluid flows. The analysis uses methods from the theory of finite dynamical systems and bifurcation theory to describe the qualitatively changes that can take place in fluid flows. The method gives qualitative descriptions of common occurrences in fluid dynamics such as ‘flow separation’, ‘flow attachment’ and the generation of ‘separation bubbles’.

Department of Mathematics
Period: 01/09/1996 → 31/08/1999
Number of participants: 1
Project Manager, organisational:
Mathematical Programming in Topology and Large Scale Optimization of Structures
Mathematical programming approaches are applied to the solution of topology and large scale optimization problems of structures. This includes tailoring of enhanced convex approximations of structural responses and the solution aspects of convex optimization problems by dual methods.

Department of Mathematics
Period: 01/09/1996 → 31/08/1997
Number of participants: 2
Project participant:
Bendsoe, Martin P. (Intern)
Project Manager, organisational:
Duysinx, Pierre (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 175,000.00 Danish Kroner

Relations
Publications:
Mathematical programming methods for large-scale topology optimization problems

Mathematical Study and Visualization of Complex Dynamical Systems
The aim of this project is to visualize hardly accessible phenomena within complex dynamical systems, such as: the parabolical implosion, holomorphic surgery and renormalization, as well as to illustrate the elementary phenomena: iteration, topological models and potential theoretical tools. In order to be able to visualize the phenomena mentioned, thorough mathematical studies are necessary. A number of known proofs need to be modified and new proofs established in order to achieve the mathematical visualization. The visualization media is the video, but it is accompanied with explicatory material, interactive programs (possibly as CD-ROM) and finally classical mathematical publications. The receiving audience includes mathematical high-school students to fellow researchers within the area. Keywords: Holomorphic dynamics, algorithms, computer animation.

Department of Mathematics
Universite Paris-Sud
Atelier EcoutezVoir
Period: 01/09/1996 → 31/08/1997
Number of participants: 4
Project participant:
Branner, Bodil (Intern)
Douady, Adrien (Ekstern)
Tisseur, Francois (Ekstern)
Project Manager, organisational:
Sørensen, Dan Erik Krarup (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 397,489.00 Danish Kroner

Non-locally Connected Quadratic Julia Sets
Work is done with non-linear dynamical systems, which appears from iterating with a complex, quadratic polynomial. The main purpose is to increase the understanding of the dynamic, geometry and topology for polynomials with locally connected Julia set. As an example, the behaviour of certain external rays under repeated parabolic perturbations are investigated. As the most important side results we should mentioned the achievement of the first known examples of connected, but not curve-connected Julia sets, as well as non-robust, renormalizeable (infinitely many times) quadratic polynomials. Present work is considering the possibility to relate the polynomial classes found to the so-called Diophantian conditions in the theory of numbers and the possibility to find quadratic Julia sets with positive measure. Keywords:
External rays, local connectedness, robustness and Julia sets.

Department of Mathematics
Universite Paris-Sud
Cornell University
Roskilde University

Period: 01/09/1996 → 31/08/1997
Number of participants: 6
Project participant:
Branner, Bodil (Intern)
Willumsen, Pia B.N. (Intern)
Douady, Adrien (Ekstern)
Hubbard, John H. (Ekstern)
Petersen, Carsten Lunde (Ekstern)

Project Manager, organisational:
Sørensen, Dan Erik Krarup (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 397,489.00 Danish Kroner

Project
Projection of computer generated pictures in Tycho Brahe Planetarium, Copenhagen
The aim of the project is to describe the projection of slides with a superwideangle projector on to the dome in the Tycho Brahe Planetarium. A mathematical model of the projection is derived so that computer generated pictures can be "counter destored" prior to projection. First a slide with a well known geometry is projected on to the dome, and the projected picture is measured by means of thodolites. The result is then used to derive the model. In this way correct pictures can be seen by the spectator in the Planetarium.

Department of Applied Civil and Environmental Engineering
Department of Physics
Department of Planning
Operations Research
Department of Informatics and Mathematical Modeling

Tycho Brahe Planetarium
Period: 01/09/1996 → 01/02/1997
Number of participants: 4
Project participant:
Sørensen, Svend Erik Børre (Intern)
Poulsen, Erik Lund (Intern)
Hansen, Per Skafte (Intern)

Project Manager, organisational:
Mærsk-Møller, Ole (Intern)

Research Monograph: Rank-Deficient and Discrete Ill-Posed Problems
Department of Informatics and Mathematical Modeling
Period: 01/09/1996 → 01/11/1997
Number of participants: 1
Project Manager, organisational:
Hansen, Per Christian (Intern)

Signalbehandling i Delfinens Sonarsystem
Statistical learning theory and neural networks
Study some statistical aspects of learning with linear and non-linear models. Use generalization theory. Study aspects of different learning procedures to analyze their relationship.

Analyse af multimodale 3D & 4D billeder

High Frequency Wheel/Rail Interaction
The formation and evolution of corrugation on wheel and rail is a big problem in railway traffic. The phenomenon remains yet to be fully understood, especially the physics of the contact between wheel and rail has not been investigated thoroughly. The most frequent used contact models are only valid for stationary cases and are thus not valid for a contact situation with corrugation involved. The aim of the Ph.d.-works is to develop analytical and numerical tools which can be used in the simulations of railway dynamics. In cooperation with DSB is a project on the measuring of noise emission from wheels and rail been established, a project which shall be used for comparison between the theoretical work and real life dynamics.
Statistisk modellering af fiskebestanden i Nordsøen

Department of Informatics and Mathematical Modeling
Period: 01/08/1996 → 28/02/2000
Number of participants: 3
Phd Student:
Kvist, Trine (Intern)
Main Supervisor:
Thyregod, Poul (Intern)
Examiner:
Jørgensen, Bent (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Sektorministerium, Stip-SU
Project: PhD

Stochastic modelling of high-resolution rainfall time series
Two approaches to generate artificial high-resolution rain series for use as input to simulation of urban drainage systems have been tested, both based on waiting times between consecutive tips of tipping bucket gauges calibrated to sample rain in a 0.2 mm depth resolution. ARIMA-models give a reasonable description of data but they have found limited practical use due to difficulties with identification, estimation and simulation of individual extreme rain events. Markov chain models including a state variable representing accumulated rain depth are able to extract the statistical properties of the data series and may be used to generate artificial rain series that resemble the original data structure. The perspective is to couple a stochastic time series model with a regional model for extreme point rainfall in order to make inference about extreme rainfall at ungauged locations.

Department of Environmental Science and Engineering
Department of Informatics and Mathematical Modeling
Period: 01/08/1996 → 30/06/1999
Number of participants: 4
Project participant:
Ambjerg-Nielsen, Karsten (Intern)
Mikkelsen, Peter Steen (Intern)
Spliid, Henrik (Intern)
Project Manager, organisational:
Harremoës, Poul (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 150,000.00 Danish Kroner
Project

Surface-bound growth modeling applied to human mandibles. Project no.: 1202, Ph.D-student Per Rønsholt Andresen
Project no.: 1202 Financed By: STVF

Department of Informatics and Mathematical Modeling
Period: 01/08/1996 → 31/07/1999
Number of participants: 2
Project participant:
Andresen, Per Rønsholt (Intern)
Project Manager, organisational:
Conradsen, Knut (Intern)

Timed RAISE
The goal of this project is to investigate how RAISE can be extended with real-time facilities.
Department of Information Technology

Department of Informatics and Mathematical Modeling

University of Bremen

United Nations University International Institute for Software Technology
Period: 01/08/1996 → 31/12/2000
Number of participants: 2
Project participant:
Peleska, Jan (Ekstern)
Project Manager, organisational:
Haxthausen, Anne Elisabeth (Intern)

Financing sources
Source: Overhead/overskud
Name of research programme: Overhead/overskud
Amount: 0.00 Danish Kroner

Project

TAST
TAST (Tvaer-sektoriel anvendelse af simuleringsteknologi) aim at developing a training simulator for combine harvester drivers, while also building up know-how in simulation at IMM. The partners are: DMI, Hjortekaer, and Dronningborg Industries, Randers. The budget at IMM is D.kr. 2.2 million, 100% financed by Erhvervsfremme Styrelsen.

Department of Informatics and Mathematical Modeling

Danish Maritime Institute

Dronningborg Industries
Period: 01/07/1996 → 31/12/1999
Number of participants: 3
Project participant:
Sørlie, James Arnold (Intern)
Carton, Denis Manuel (Intern)
Project Manager, organisational:
Hansen, Per Skafte (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 495,817.00 Danish Kroner

Project

Analysis of Electromyographic Signals
The object of this project is the analysis of motor unit potentials measured by needle electrodes in muscles. The application area is clinical diagnosis of muscle- and nerve diseases. Emphasis is concentrated on analyzing the sequence of potentials and partculiar variations in the potentials forms. These variations, also denoted variability, are expected to form diagnostic parameters for the clinical diagnosis of muscle- and nerve diseases. Furthermore they are expected to form a basis for the analysis of the restitution process of nerve- and muscle lesions. A database consisting of measurements on normal persons and patients with a selection of muscle and nerve diseases has been established. Among others the database contains a selection of measurements which is expected to originate in the variabiliy phenomenon. The analysis system is being used for clinical diagnosis at the Department of Neurophysiology, The Royal Hospital. In the period of reporting, the work has concentrated on the elaboration of the ph.d. thesis.

Department of Informatics and Mathematical Modeling

Royal Hospital

Panum Institute

Kristian Dahl
Period: 01/06/1996 → 20/04/1999
Number of participants: 4
Project participant:
Hansen, Steffen Duus (Intern)
Jakob Nielsen and his Contributions to Topology
The Danish mathematician Jakob Nielsen won international recognition as one of the developers of combinatorial group theory and the topology of surfaces. In the period 1925–1951, Nielsen was professor of rational mechanics at the Technical University of Denmark; in this connection he wrote a highly original textbook in rational mechanics. A biography of Jakob Nielsen, to be included in a monograph on the history of topology, has been written; it contains new informations about his relations to other mathematicians and a description of his pioneering work in the topology of surfaces.

Department of Mathematics
Period: 01/06/1996 → …
Number of participants: 1

The Vector Riccati Equation
We extend the theory for the scalar Riccati equation to the multidimensional case

Department of Mathematics
Period: 01/06/1996 → …
Number of participants: 2

Identifikation og regulering af rensningsanlæg

Department of Informatics and Mathematical Modeling

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 36,175.00 Danish Kroner

Modellering og Prædiktiv Styring af Spildevandssystemer
Department of Informatics and Mathematical Modeling
Period: 01/05/1996 → 28/04/2000
Number of participants: 3
Phd Student:
Bechmann, Henrik (Intern)
Supervisor:
Poulsen, Niels Kjølstad (Intern)
Main Supervisor:
Madsen, Henrik (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Erhvervsforskerordningen
Project: PhD

Cryptology
We study the construction and cryptoanalysis of some private and public key crypto systems

Department of Mathematics
Period: 01/03/1996 → 01/09/1999
Number of participants: 2
Project participant:
Jakobsen, Thomas (Intern)
Project Manager, organisational:
Haholdt, Tom (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 900,000.00 Danish Kroner
Project

Stochastic modelling of nonlinear systems

Department of Informatics and Mathematical Modeling
Period: 01/03/1996 → 29/03/2001
Number of participants: 4
Phd Student:
Nielsen, Jan Nygaard (Intern)
Main Supervisor:
Madsen, Henrik (Intern)
Examiner:
Poulsen, Niels Kjølstand (Intern)
Ljung, Lennert (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-Su Stipendium, Eksperiment
Project: PhD

Topology Optimization - Methods, Convergence and Adaptive Finite Elements
Mathematical studies are carried out on the convergence of finite element solutions within optimization of structural topology.

Department of Mathematics
Department of Solid Mechanics
Period: 01/03/1996 → 28/02/1997
Number of participants: 3
Project participant:
Bendse, Martin P. (Intern)
Sigmund, Ole (Intern)

Project Manager, organisational:
Petersson, Joakim (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 350,000.00 Danish Kroner
Project

BioSonar (EU project MA53-CT95-0026)
Monitoring of typical benthic communities and quantification of their living conditions is an important tool for establishing and maintaining knowledge about marine environments. The health of benthic communities is closely influenced by environmental impacts due to human activities in coastal areas, and many benthic communities have central roles in their ecosystems. In Northern Europe this applies to e.g. common mussels (Mytilus edulis) and in the Mediterranean to e.g. neptune grass (Posidonia oceanica). The neptune grass meadows and the common mussel beds play vital roles in favouring biological diversity in the marine ecosystems. Benthic communities are good environmental impact indicators as they respond in well-understood ways, and are important for the sustainability of their ecosystems. The priorities for protection of the environment are strengthened in these years, and the demands for information at higher resolution scales are continually rising. Thus, it is vital to develop methods and technology dedicated to deliver high resolution information on the health of the environment, in particular the difficult observable conditions at sea. The overall aim of the BIOSONAR project is to contribute to the development of technologies and methodologies for use of acoustic equipment in monitoring of biological communities at the sea floor. The project is considered a step towards a larger goal comprising development of equipment and data processing algorithms dedicated to produce sonar pictures of larger sea bottom areas on a level equivalent to current earth observation technology. The expected results of the project will be a validated methodology for estimation of distribution of benthic communities based on sonar monitoring.

Department of Informatics and Mathematical Modeling
Period: 01/02/1996 → 31/01/1999
Number of participants: 7
Project participant:
Sørensen, Per S. (Intern)
Ersbøll, Bjarne Kjær (Intern)
Ersbøll, Annette Kjær (Intern)
Nielsen, Allan Aasbjerg (Intern)
Hilger, Klaus Baggesen (Intern)
Schultz, Nette (Intern)

Project Manager, organisational:
Conradsen, Knut (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
**Block Ciphers**

Block ciphers are a class of symmetric cryptosystems used for secure communications. The project examines the strength of various types of block ciphers using generalizations of linear cryptanalysis and a new approach called the interpolation attack. Moreover, relations between coding theory and cryptography are investigated, e.g., the connection between the theory of S-boxes used in block ciphers and the theory of linear codes. The project also examines some complexity theory related issues concerning cryptography.

**Department of Mathematics**

**Period:** 01/02/1996 → 01/08/1999

**Number of participants:** 1

**Project Manager, organisational:**

Jakobsen, Thomas (Intern)

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**Financing sources**

**Source:** Internal funding (public)

**Name of research programme:** DTU-Su Stipendium, Eksperiment

**Project:** PhD

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**Kryptologi**

**Department of Mathematics**

**Period:** 01/02/1996 → 23/09/1999

**Number of participants:** 3

**PhD Student:**

Jakobsen, Thomas (Intern)

**Main Supervisor:**

Høholdt, Tom (Intern)

**Examiner:**

Jensen, Helge Elbrønd (Intern)

**Financing sources**

**Source:** Internal funding (public)

**Name of research programme:** DTU-Su Stipendium, Eksperiment

**Project:** PhD

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**Modelling of Nonlinear Dynamical System**

This project was carried out under a cooperation with the Institute of Mathematical Modeling (IMM), DTU. Simulation and practice experiments were performed using a hydraulic robot. The obtained model was intended to provide a basis for model-based control of the robot. The physical model was formulated in continuous time and was derived by application of the laws of physics on the system. The unknown (or uncertain) parameters were estimated with Maximum Likelihood (ML) parameter estimation. The identified model was evaluated by comparing the measurements with simulation of the identified model.

**Department of Control and Engineering Design**

**Department of Informatics and Mathematical Modeling**

**Department of Mechanical Engineering**
Phantom models
The project goal has been to establish techniques making it possible to control the perspective effects and stereoscopic parameters in a stereogram independently. Of particular interest is the application of these techniques to obliquely projected stereograms, giving rise to the so-called "Phantom models". The project has led to the submission of a patent application, nr. 00849, priority date 26.06.98. In the interest of prospective license takers, the technical contents of the project are withheld until the expiry of the so-called priority year, i.e. until 26.06.99. The project was supported by Danish Agency for Trade and Industry, total support amounting to D.Kr. 180,000. The mediator was Frank Knudsen, Danish technological Institute. Project leader: Svend B. Sørensen, FYS-DTU Project members: Per Skafte Hansen, IMM-DTU Nils Lykke Sørensen, AAA

Department of Physics
Department of Informatics and Mathematical Modeling

Prædiktorer i komplekse stokastiske systemer
Department of Informatics and Mathematical Modeling

Stokastisk Prædiktiv Kontrol i Komplekse Systemer
Department of Informatics and Mathematical Modeling
Examination of statistical methods for analysis of gamma-ray spectra
Existing methods for examination of airborne gamma-ray spectra with the aim of detecting minor amounts of manmade radioactivity in the environment are evaluated and compared to promising new methods.

Department of Automation
Department of Informatics and Mathematical Modeling
Department of Electrical Engineering

Period: 16/01/1996 → 31/03/1996
Number of participants: 2
Project participant:
- Paulsen, Dorte Eide (Intern)
- Korsbech, Uffe C C (Intern)

2-convex Differential Systems
We generalize the notion of 2-convexity to vector functions and try to derive results on the number of and the stability properties for closed solutions of differential systems with a 2-convex right hand side.

Department of Mathematics

Period: 01/01/1996 → …
Number of participants: 2
Project participant:
- Andersen, Kurt Munk (Intern)
- Sandqvist, Allan (Intern)

3D-Med
The project is carried out together with Assoc. Prof. Jan Madsen at IT, DTU, in collaboration with 3D-Lab, which is situated at the Panum Institute, at the University of Copenhagen. In 1998 the project has been enlarged to include a collaboration with Århus University Hospital, where Prof. Niels Egund has joined the project. In 1999 the project included a collaboration with Prof. Børresen, the Rigshospitalet and Carl Bro A/S, which will produce a report describing the technical and commercial possibilities to continue the project. This activity is supported by Erhversfremmestyrelsen. The project started as a case study in the Codesign project. The main topic in this project, is to design and implement a cost efficient workstation, based on an ordinary PC running MicroSoft Windows, which can be used for 3-dimensional modelling and manipulation of medical objects. The main idea is to bring this functionality form the specialists laboratory to the desk of the physicians in the clinic. In 1998 Hans Holten-Lund has started a Ph.D. study and Mogens Hvidfeldt was employed as a research assistant within the project. Both activities has been supported financially by the Thomas B. Thriges Center for Microinstruments

Department of Information Technology
Department of Informatics and Mathematical Modeling
Panum Institutet
Aarhus University
Carl Bro A/S
University of Copenhagen

Period: 01/01/1996 → …
Number of participants: 3
Adaptive Extremum control.
Ph.D. project. Ma Xin. The main idea in this project is to maximize some performance criteria by using adaptive control methods. The purpose of the controller design is to increase the efficiency of some processes. The extremum control is related to optimization techniques. A wind turbine is taken as an example for applying adaptive extremum control. In order to design a high performance control system, a detailed model of dynamic behaviour of the wind turbine is needed. Such a model can be achieved from two approaches: theoretical method and identification techniques. In this year the nonlinear theoretical model is established by using Simulink, the system is modelled from known physical interpretations. Some control methods require the knowledge of wind speed, but it is impossible to measure the effective wind speed on the rotor plane. Therefore estimation of wind speed on the rotor plane is considered by using the wind turbine as wind measuring device. Several estimation methods are investigated.

Computer Science and Engineering
Department of Informatics and Mathematical Modeling
Risø National Laboratory for Sustainable Energy
Period: 01/01/1996 → …
Number of participants: 3
Project participant:
Ma, Xin (Intern)
Bindner, Henrik (Ekstern)
Project Manager, organisational:
Poulsen, Niels Kjølstad (Intern)

Algebraic groups and algebraic geometry over finite fields
We study algebraic geometry over finite fields and construct error correcting codes and cryptographic systems.

Department of Mathematics
Period: 01/01/1996 → 31/12/1998
Number of participants: 8
Project participant:
Jakobsen, Thomas (Intern)
Jensen, Helge Elbønd (Intern)
Jensen, Jørn Møller (Intern)
Nielsen, Rasmus Refslund (Intern)
Heydtmann, Agnes Eileen (Intern)
Beyer, Joan (Ekstern)
Project Manager, organisational:
Høholdt, Tom (Intern)
Andersen, Henning Haahr (Ekstern)

Analysis of Regularity for Partial Differential Equations
Boundary value problems are considered for elliptical differential operators, where the boundary conditions are given in a distributional sense. This allows for the modelling of systems with distributed parameters and pointwise feedback coupling...
on the boundary. A simple method has been developed to determine well-posedness features for classical non well-posed problems.

Department of Mathematics
Period: 01/01/1996 → …
Number of participants: 1
Project Manager, organisational:
Pedersen, Michael (Intern)
Project

**Application of fuzzy systems within traffic planning.**
The application of fuzzy logic and neural nets has been analyzed and the potential applications within traffic planning has been considered. The project is made in cooperation with the company TetraPlan and it is financed by The Danish Transport Council.

Department of Informatics and Mathematical Modeling

Tetraplan A/S
Period: 01/01/1996 → 31/12/1997
Number of participants: 1
Project Manager, organisational:
Madsen, Oli B.G. (Intern)
Project

**Automated Visual Inspection of Textile**
A system for in-line inspection of textile using a line-scan camera is designed. Algorithms based on stochastic modelling of weave pattern are developed and tested.

Department of Informatics and Mathematical Modeling

Mitex
Period: 01/01/1996 → 31/08/1997
Number of participants: 2
Project participant:
Fisker, Rune (Intern)
Project Manager, organisational:
Carstensen, Jens Michael (Intern)
Project

**Bedømmelse af den atmosfæriske turbulens over områder af varierende overfladetype**

Department of Mathematics
Period: 01/01/1996 → 11/03/1999
Number of participants: 4
Phd Student:
Falk, Anne Katrine Vinther (Intern)
Main Supervisor:
Brøns, Morten (Intern)
Examiner:
Ditlevsen, Ove Dalager (Intern)
Heimburg, Thomas (Ekstern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: Forskerakademiets Samfinansier
Project: PhD

**Bifurcational Control**
Geometric and dissipative methods of non-linear control are applied on a bifurcational problem arising in fluid mechanics, more precisely in the control of turbocompressors.

Department of Mathematics
Bifurcation in Chemical Systems
Bifurcations in systems of chemical reactions are investigated with a combination of analytical and numerical methods.

Department of Mathematics
Tel Aviv University

Bifurcations and chaos in Nonlinear Dynamics
In relation to specific high-dimensional parameter dependent nonlinear dynamic systems - mainly models of moving railway vehicles - the dynamics of the systems is examined, and the qualitative behaviour investigated. Since the models are rather complicated, the analysis is carried out numerically, and some results verified through analytic investigations of simple model examples. The results are applied to actual railway vehicles, and have demonstrated their ability to predict accurately the critical speed, at which a railway vehicle may change its stable equilibrium state from steady motion along the track center line, to a motion along the track combined with a lateral oscillation. Chaotic motion has been predicted, and recently confirmed by Japanese scientists.

Department of Informatics and Mathematical Modeling

Bounds on the Effect of Progressive Structural Degradation
In classical, phenomenological models for damage in elastic materials it is assumed that damage results in reduced stiffness of the material. Normally a linear interpolation is applied and the damage propagation is found as the distribution of damage maximizing the global stiffness reduction. The linear interpolation induces technical difficulties in continuum models, since one will typically not have existence of the solution in an ordinary sense. The project has considered alternative interpolations and it has been found that linear interpolation of the inverse stiffness provides a physically realistic and well posed model. Moreover, it is possible to establish highly efficient numerical algorithms, which in complexity are comparable to algorithms for solving classical problems in elasto plasticity. Keywords: Damage models, convex analysis.

Department of Mathematics
University of Michigan

Friedrich-Alexander University Erlangen-Nuremberg

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 20,000.00 Danish Kroner
Source: Unknown
Chloride Ingress into Concrete
New models for estimation of chloride ingress into concrete and prediction of service lifetime with reference to marine RC structures and solutions of these models. The project is carried out in cooperation with Professor emer. Ervin Poulsen, Ervin Poulsen Aps., Skovbrynet 8, Noedebo, DK-3480 Fredensborg.

Department of Mathematics
Period: 01/01/1996 → ...
Number of participants: 1
Project Manager, organisational: Mejlbro, Leif (Intern)

Classical Differential Geometry Revisited
The purpose of this project is to advance the use of the computer as a natural vehicle for the teaching of - and research in - advanced differential geometry as well as for the revitalization of interesting classical insight into low dimensional geometrical invariants.

Department of Mathematics
Period: 01/01/1996 → ...
Number of participants: 1
Project Manager, organisational: Markvorsen, Steen (Intern)

Classification of Closed Strips in the Three Dimensional Euclidean Space
Take a strip of paper and 'twist' it, tie a knot on it, and glue its ends together. This is the model for a class of geometric objects which we call the class of closed strips. We define the twisting number of a closed strip which is an invariant of ambient isotopy measuring its topological twist. We classify closed strips in euclidean 3-space by their knots and their twisting number. We have proven that this classification exactly divides closed strips into isotopy classes. Using this classification we point out how some polynomial invariants for links lead to polynomial invariants for strip links. We give a method for knotting a strip with control on its twist, and our method includes a closed braid description of a closed strip. Finally, we generalize the notion of closed braids, allowing braids to be closed by any oriented knot and not only by the unknot. The inverse braid closing operator problem is still open, but it contains Markovs Theorem for classical closed braids as a special case.

Department of Mathematics
Period: 01/01/1996 → 01/06/1997
Number of participants: 4
Project participant: Markvorsen, Steen (Intern)
Gravesen, Jens (Intern)
Randrup, Thomas (Intern)
Project Manager, organisational: Røgen, Peter (Intern)

Coding Theory
Error-correcting codes, chryptography and data compression are essential tools for reliable, secure, and fast transmission of information in a modern communication system. Many of the mathematical problems that arises can be treated with algebraic, geometric and combinatorial methods. The main research effort is concentrated on the fundamental problems in error-correcting codes, that is analysis and construction of good codes along with the design of low complexity encoding and decoding algorithms.
Colour and texture inspection equipment ESPRIT Project 21023 - CATIE

The objective is to provide cost effective colour and texture based automatic inspection and sorting solutions for industry. Three application areas are considered: Hot steel strip, wood slabs, and food. Novel solutions for low delay image analysis, a few tens of milliseconds from imaging to decision, will be developed and used in real-time on-line inspection demonstrators in each application. The inspection system platform will be the same and exploit an off-the-shelf component based parallel architecture designed to support hypothesis-and-verification oriented inspection strategies. The platform will cope with the high volumes of data associated with colour and texture inspection. The basic technology of high-performance personal computers will be used. Because of the vibrations of hot strip and the nature of motion of food particles to be sorted high speed prism based colour line-scan cameras will be developed to capture the RGB values of each pixel at the same time. Due to the required high line scan rates, stable illuminators with feature enhancing radiation patterns will be designed, and an online colour camera calibration technique will be developed to make the colour measurements independent of longer term changes in illumination.

Department of Informatics and Mathematical Modeling

Spectra-Physics VisionTech, Oy
ELEXSO Sortertechnik GmbH
Junckers Industrier A/S
STN Atlas Elektronik GmbH
T.V.I. - Temet Vision Industry Oy
Fraunhofer Gesellschaft
University of Oulu
VTT - Technical Research Centre of Finland

Combinatorial Differential Geometry

The purpose of this project is to use finite distance geometry in conjunction with theoretical work on Alexandrov spaces to find good candidates for metric invariants that can efficiently be used to recognize and characterize Riemannian manifolds and metric spaces in general. Computer experiments play a natural and very crucial role for the advancement of this project.

Department of Mathematics
**Concatenated Codes**

A concatenated code consist of two codes: A short "inner" code and a long "outer" code. The outer code is often a Reed-Solomon code. Concatenation is the only known construction which allows for the correction of a large number of errors, with a fairly low complexity. Concatenated codes are therefore widely used. In this project we study the algebraic structure of concatenated codes. This analysis has led to the construction of large classes of cyclic codes, which performs better than the well-known and widely used BCH codes. It has also led to the design of a low-complexity Reed-Solomon encoder. Some problems concerning decoding are currently under investigation.

**Consciousness.**

A global dynamic state of the brain is widely recognized as "consciousness" but this state is poorly understood from the point of view of descriptive science. It is proposed that the key to understanding such phenomena as consciousness and life will be the study of dynamics systems that are nested into hierarchies of integro-differential equations. Life and consciousness are then expected to emerge as multi-level global states of hierarchical system. A major international conference on this subject has been organized in Copenhagen and Elsinore, August 1997. Publications (ACS refers to A.C.Scott's publication list): ACS2, ACS3, ACS4, ACS6

**Convex and Concave Differential Systems**

We consider a system $x'=f(t,x)$ of $n$ first order differential equations, where all coordinate functions are weakly convex (or weakly concave ) in $x$. We have investigated how the closed solutions behave in subsets (of suitable form), in which the off-diagonal entries in the Jacobi matrix have fixed sign. The investigations have shown that it is possible to generalize an earlier (published) result in the case $n=1$ on the number of closed solutions. Furthermore, we have found some geometrical and topological properties of the set of initial points for closed solutions in a subset of the mentioned type. These results are in particular interesting in the cooperative (or the competitive) case.

**Correlating phospholipid fatty acids (PLFA) in a landfill leachate polluted aquifer with biochemical factors by multivariate statistical methods.**

Different multivariate statistical analyses were applied to phospholipid fatty acids representing the biomass composition and to different biogeochemical parameters measured in 37 samples from a landfill contaminated aquifer at Grindsted.
Landfill (Denmark). Principal component analysis and correspondence analysis were used to identify groups of samples showing similar patterns with respect to biogeochemical variables and phospholipid fatty acid composition.

Department of Informatics and Mathematical Modeling

Department of Environmental Science and Engineering

Period: 01/01/1996 → 31/12/1997
Number of participants: 2
Project participant:
Ludvigsen, Liselotte (Intern)

Project Manager, organisational:
Rootzén, Helle (Intern)

Crew and vehicle scheduling.
The objective of the project is to develop methods for finding the optimal or near optimal scheduling of crews and vehicles. Rules concerning e.g. working periods and union regulations have to be taken into consideration. In 1996 a system ACROS has been developed for computer based crew rostering, in particular applicable for medium term planning for allocation of bus drivers. ACROS was developed in cooperation with the company TR-Partners. Furthermore a system concerning the scheduling of duties for nurses has been developed. The system is based on set partitioning and constrained branch and bound, and it was developed in cooperation with Hovedstadens Sygehusselskab and Andersen Consulting.

Department of Informatics and Mathematical Modeling

TR Partner
Period: 01/01/1996 → 31/12/1998
Number of participants: 2
Project participant:
Larsen, Allan (Intern)

Project Manager, organisational:
Madsen, Oli B.G. (Intern)

Financing sources
Source: Unknown
Name of research programme: Upendt
Amount: 100,000.00 Danish Kroner

Cycles in Graphs
In 1996 we have developed a general method for finding a second hamiltonian cycle in a hamiltonian graph. The method has been used to attack the conjecture made by Thomassen in 1976 that every longest cycle in a 3-connected graph has a chord. The conjecture has now been verified for cubic graphs. Furthermore, it has been proved in a joint work with R.E.L. Aldred, New Zealand, that the number of cycles in a cubic, 3-connected graph grows superpolynomial, a conjecture made in 1986 by Barefoot, Clark and Entringer. In 1997 we have combined the sufficient condition for a second hamiltonian cycle in terms of independent dominating sets with Lovasz' Local Lemma to prove that every hamiltonian r-regular graph has a second hamiltonian cycle if r is at least 300. This is a step towards the 1975 conjecture of John Sheehan that every such graph has a second hamiltonian graph provided r is at least 4. In 1997 we also proved the conjecture made by Bermond, Fouquet, Habib and Peroche in 1984 that every cubic graph has a 2-edge-coloring such that each monochromatic component is a path of length at most 5. The number 5 cannot be replaced by 4.

Department of Mathematics
Period: 01/01/1996 → 31/12/1998
Number of participants: 2
Project participant:
Aldred, R.E.L. (Ekstern)

Project Manager, organisational:
Thomassen, Carsten (Intern)

DANMAC - DANish Multisensor Airborne Campaign
Project no.: 1243. The purpose of the project is to achieve a better understanding of the physical conditions and processes at the surface influencing the signal of both optical and radar sensors. The DANMAC project is a multisensor and multidisciplinary remote sensing campaign, consisting of four test sites covering one for agriculture/forestry, two for landscape-ecology/natural type and one for inland waters (lekes). For each test site extensive ground data collection takes
place together with simultaneous data acquisition by airborne and spaceborne SAR's and/or optical/infrared sensors. Following the data collection, data processing, modelling and interpretation take place at the collaborating institutes in a coordinated effort.

Department of Informatics and Mathematical Modeling
Period: 01/01/1996 → 30/04/1999
Number of participants: 1
Project ID: 1243
Project Manager, organisational:
Nielsen, Allan Aasbjerg (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 114,738.00 Danish Kroner
Project

DECO, Danish Environmental monitoring of COastal waters. Project no.: 1221
Project no.: 1221. The traditional monitoring of the Danish marine environment is currently based primarily on ship sampling/measurements. All the various monitoring programmes ranging from the traditional environmental ones to fisheries monitoring and monitoring of spills from off-shore constructions can benefit from the utilization of remote sensing data. The satellites provide a temporal and spatial coverage, which is unmatched by other existing techniques. The current project will focus on environmental parameters (e.g. water quality parameters) influencing the optical, spectral signature of water (e.g. the reflectance of sun-light as a function of wavelength) in the visible to near-infrared part of the spectrum. These parameters are phytoplankton, suspended sediments and yellow substances. In shallow waters also bottom-types and depths influence the recorded signal. Three levels of simultaneous spectral measurements (in situ, airborne & spaceborne) will be included in order to make accurate correction for atmospheric and instrument specific distortions.

Department of Informatics and Mathematical Modeling
Period: 01/01/1996 → 31/12/2000
Number of participants: 1
Project Manager, organisational:
Nielsen, Allan Aasbjerg (Intern)
Project

Deformation of Surfaces in Threespace
Given an embedded two-dimensional surface in three space, and a smooth deformation of the metric (the first fundamental form), is it then possible for this intrinsic deformation of the metric to be induced by an extrinsic deformation of the embedding. If the intrinsic deformation is trivial (the metric is constant), then the question is the so called bending problem.

Department of Mathematics
Period: 01/01/1996 → …
Number of participants: 1
Project Manager, organisational:
Gravesen, Jens (Intern)
Project

Delta-domain predictive control and identification for control.
Traditionally, discrete-time sampled-data systems are represented using shift-operator parametrizations. Such parametrizations are not suitable at fast sampling rates. An alternative parametrization using the so-called delta-operator is examined. It is shown how to maintain a close correspondence to continuous-time when sampling a system described in continuous-time by stochastic differential equations. A new prediction method is developed. It is based on ideas from continuous-time but derived from discrete-time delta-operator models. It is shown to include the optimal minimum-variance predictor as a special case and to have a well-defined continuous-time limit. By means of this new prediction method a unified framework for discrete-time and continuous-time predictive control algorithms is developed. This contains a continuous-time like discrete-time predictive controller which is insensitive to the choice of sampling period and has a well-defined limit in the continuous-time case. Also more conventional discrete-time predictive control methods may be described within the unified approach. The predictive control algorithms are extended to frequency weighted criterion functions. Also a state-space approach is described which extends straightforwardly to the multi-variable case. Finally, aspects on the connection between system identification and control design are discussed. Several approaches to improve this interconnection have been proposed. The frequency-distribution of the estimation error with low-complexity models is treated and proves to be important for the development of control-relevant prefilters in estimation. Iterative approaches are presented, both using standard estimation methods with prefiltering and non-standard control-relevant estimation methods. New combined adaptive/iterative techniques are proposed.
Design of Material and Structure for Optimal Damage
The work is based on a micro mechanical model, allowing for a combination of topology design using a material distribution method with micro mechanical models for damage to structures. An important element is to achieve a well-posed formulation, which is also reasonable to handle numerically. Furthermore, dual formulations of damage models are considered, with the aim to achieve formulations suitable for optimization. Keywords: Optimal topology, optimal material, damage models.

Department of Mathematics
Michigan State University
Period: 01/01/1996 → 15/11/1997
Number of participants: 2
Project participant:
Diaz, A. (Ekstern)
Project Manager, organisational:
Bendsøe, Martin P. (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 15,000.00 Danish Kroner
Source: Unknown
Name of research programme: Ukendt
Amount: 15,000.00 Danish Kroner
Source: Unknown
Name of research programme: Ukendt
Amount: 25,000.00 Danish Kroner
Source: Unknown
Name of research programme: Ukendt
Amount: 10,000.00 Danish Kroner

Development of the Image in a Photocopying Machine
The mathematical problem to compute the development of the toner image from an electrostatic one during photocopying has been studied from the point of view of existence and uniqueness by Friedman and coworkers. Here we formulate the problem as an integral equation. We use the Green's function involved to solve the problem exactly at the initial instant and approximately by numerical solution of the equation at later times.

Department of Mathematics
Period: 01/01/1996 → 01/05/1997
Number of participants: 1
Project Manager, organisational:
Hansen, Erik Bent (Intern)

Dissipative methods
Project nr. 1219 Ph.D project. Uffe Hoegsbro Thygesen Control systems are often based on a mathematical model for the control object in terms of ordinary differential equations. There is always some uncertainty in such a model which may be modelled in terms of unknown system components (perturbations), uncertain parameters, and stochastic disturbances. A powerful framework for addressing the unknown system components builds on Jan C. Willem's theory of dissipation. Here one starts out with establishing quantities that the single component cannot produce, for instance energy. Then one investigates how these properties constrain the dynamical behaviour of the component. In a final step one is then able to give qualitative statements about the overall system. In this project we investigate the application of dissipation theory to robust (or worst-case) control. To this end we investigate system components which possess several properties of dissipation. Furthermore we consider adaptive control problems in which we seek controllers which are able to make the
control object dissipative even when parameter uncertainty is present. Finally we develop a framework of dissipation applicable to systems in which stochastic disturbances also are present.

**Department of Informatics and Mathematical Modeling**

**Period:** 01/01/1996 → ...
**Number of participants:** 2
**Project participant:**

- **Thygesen, Uffe Høgsbro (Intern)**
- **Poulsen, Niels Kjølstad (Intern)**

**Financing sources**

- **Source:** Unknown
- **Name of research programme:** Ukendt
- **Amount:** 108,100.00 Danish Kroner

**Dissipativity and Control of Invariant Sets**

Combining the theory of dissipative control, in special H-infinity control, with Lyapunov-like stability arguments such as La Salles invariance principle, the dynamics of nonlinear systems are controlled with multiple control objectives as stability of invariant sets with $L^2$ gain attenuation, or with Input-to-State stability. The region of validity for such multiple task nonlinear controllers is estimated and the robustness of these controllers is investigated.

**Department of Mathematics**

**Period:** 01/01/1996 → 31/05/1998
**Number of participants:** 1
**Project Manager, organisational:**

- **Cromme, Marc (Intern)**

**Does pigmentation protect against ultraviolet B induced immunosuppression?**

**Department of Informatics and Mathematical Modeling**

-Amtsygehuset i Gentofte

**Period:** 01/01/1996 → ...
**Number of participants:** 2
**Project participant:**

- **Skov, Lone (Ekstern)**
- **Ersbøll, Bjarne Kjær (Intern)**

**Dynamisk kvalitetskontrol**


**Department of Informatics and Mathematical Modeling**

**Period:** 01/01/1996 → ...
**Number of participants:** 3
**Project participant:**

- **Thyregod, Poul (Intern)**
- **Iversen, Jørgen (Ekstern)**
- **Madsen, Henrik (Intern)**
Error Diagnosis in Dynamical Control Systems
A control system generates control signals to a dynamical system, based on a number of measurements. The set of measurements are established by one or more sensors. The control signals change the behaviour of the dynamical system via a number of actuators. In several applications it is important to be able to determine whether the actuators and/or sensors fail. The present project studies analytical methods for determining whether the function of actuators and sensors are satisfactory, by investigating whether correlated values (in functional spaces) of control signal and measurements are consistent with the differential equations modelling the system. A number of results has been achieved, that reveals advantages and disadvantages in integrating the dimensioning process for control and diagnosis system. Moreover, explicit algorithms for the integrated design are given.

Department of Mathematics
Department of Automation
Period: 01/01/1996 → 31/12/1997
Number of participants: 2
Project participant:
Niemann, Hans Henrik (Intern)
Project Manager, organisational:
Stoustrup, Jakob (Intern)

Estimation and quantification of digitised craniofacial X-rays
Department of Informatics and Mathematical Modeling
University of Copenhagen
Period: 01/01/1996 → …
Number of participants: 2
Project participant:
Paulsen, Hans Ulrik (Ekstern)
Project Manager, organisational:
Ersbøll, Bjarne Kjær (Intern)

Extremal Overall Elastic Response of Polycrystalline Materials
A simple polycrystal is a composite material consisting of a mixture of a number of rotated crystals of the same anisotropic material. Based on a variational characterization of the effective material parameters, bounds on the energy in such polycrystals are calculated analytically in the form of what is referred to as optimal bounds, that is bounds which always hold and which cannot be sharpened. In the calculation no assumptions have been made concerning the symmetry of the polycrystal. The achieved energy bounds have also been compared to other bounds, achieved for crystals with certain material symmetries (e.g. isotropy). Keywords: Polycrystals, bounds, effective parameters.

Department of Mathematics
Worcester Polytechnic Institute
Period: 01/01/1996 → 15/12/1997
Number of participants: 2
Project participant:
Lipton, R. (Ekstern)
Project Manager, organisational:
Bendsøe, Martin P. (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 15,000.00 Danish Kroner
Source: Unknown
Name of research programme: Ukendt
Amount: 10,000.00 Danish Kroner
Source: Unknown
Name of research programme: Ukendt
Amount: 20,000.00 Danish Kroner
Fault detection in dynamic systems
In the control of industrial systems, it is rare that a control system functions continuously without shutdown throughout the scheduled life cycle of the plant and controller hardware. Owing to ware of mechanical and electrical components, both actuators, sensor and internal components can fail in more or less critical ways. For safety critical processes, it is of paramount importance to detect when faults are likely to happen and then to identify these faults as fast as possible once they have occurred. To meet such industrial needs, a number of schemes for fault detection and isolation (FDI) have been set up. Much of the research has dealt with the design of filters which monitor a process and generate alarms when faults have occurred. In most cases, the filters are model based devices which act independently of the computer implemented digital controller. In this project, the focus is on both analysis and design of fault detectors as well as the task of combining control algorithm and FDI filters in a single module. In the area of analysis and design of fault detectors, both observer based detectors as well as more general filters are applied. The work done in this area has primary been focus on the possibility to apply systematic standard methods from robust and optimal control for the analysis and design of fault detectors. The work done until now in the area of combining fault detector and controller has just been started. A general setup for the design of a combined fault detector and controllers has been formulated using standard methods from robust control. It has been shown by examples, that it is possible to obtain a very large reduction the dynamic order of the control module compared to the case when separate fault detector and controller are applied.

Department of Automation
Department of Mathematics
Period: 01/01/1996 → …
Number of participants: 4
Project participant:
Rank, Mike Lind (Intern)
Kilsgaard, Søren (Intern)
Stoustrup, Jakob (Intern)
Niemann, Hans Henrik (Intern)

Footprint analysis/ Source weight functions
When measuring a scalar flux, it is interesting to know how representative it is for the area in which the sensor is placed. The “footprint” or “source weight function” is a measure of the relative contribution from an upwind source to the measured flux. It is the aim of the project to determine the footprint for an inhomogeneous fetch by simulating the scenario with a random walk model.

Department of Mathematics
Period: 01/01/1996 → 31/12/1998
Number of participants: 1
Project Manager, organisational:
Falk, Anne Katrine Vinther (Intern)

Fourier Analysis of Pseudo Differential Boundary Value Problems
The regularity of various boundary element methods are analysed using pseudo differential methods. Results achieved may be used to improve the convergence for a number of numerical methods.

Department of Mathematics
Texas A&M University
Period: 01/01/1996 → …
Number of participants: 1
Project Manager, organisational:
Pedersen, Michael (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 164,000.00 Danish Kroner
Fundamental Operations in Linear Algebra
The investigation of the parallel equation solver continues. Problems in connection with small systems have been solved.

Department of Informatics and Mathematical Modeling
Period: 01/01/1996 → 01/10/1998
Number of participants: 1
Project Manager, organisational: Tingleff, Ole (Intern)

Gauss-Bonnet's Formula and Closed Frenet Frames
Closed space curves with non-vanishing curvature defines via the Frenet formulas some closed curves on the unit 2-sphere, called the spherical indicatrices. By using Gauss-Bonnet's Formula after cutting a spherical curve into simple closed sub-curves an index on the unit 2-sphere is found. This spherical index may be seen as a spherical analogy to the winding number of closed plane curves. The spherical index has the property that the integral over the unit 2-sphere of this index, equals the integrated geodesic curvature of the spherical curve. Using this result on the spherical indicatrices of a space curve, we obtain almost similar proofs of some (generalizations of) classical theorems. The spherical index gives both upper and lower bounds on the total curvature and total torsion of space curves.

Department of Mathematics
Period: 01/01/1996 → 31/01/1999
Number of participants: 3
Project participant: Hansen, Vagn Lundsgaard (Intern)
Markvorsen, Steen (Intern)
Project Manager, organisational: Røgen, Peter (Intern)

Geometric Measure Theory
Determination of measures in infinite dimensional spaces by means of their values on systems of balls; density and differentiation theorems for such systems. The project is carried out in cooperation with Professor David Preiss, University College London, England, and Professor Jaroslav Tiser, Technical University of Prague, Czech Republic.

Department of Mathematics
Period: 01/01/1996 → …
Number of participants: 1
Project Manager, organisational: Mejlbro, Leif (Intern)

GEOSONAR, GEOid and Sealevel Of the North Atlantic Region.
The goal of the GEOSONAR project is to develop methods for integrating multi sensor and multi channel satellite data for improved recovery of the sea level height. This will be carried out at regional scales (10-20 km) in the North Atlantic region as well as at local scales (3-5 km) in the Danish seas. Hereby, the understanding of the ocean, its state, and its dynamics will be improved. In turn, this will lead to enhanced ocean tides modelling, sea level forecasting and storm surge warning. Furthermore, Denmark will contribute to the success of EU COST action 40 that is currently being signed. An important goal is also to prepare for the dedicated gravity mission and develop methods for enhanced analysis of the gravity field, so that Denmark can play a central role in the future determination of the geoid, the sea level, and possible effects of Global Change.

Department of Informatics and Mathematical Modeling
Period: 01/01/1996 → 31/12/2001
Number of participants: 1
Project Manager, organisational: Nielsen, Allan Aasbjerg (Intern)

Graphs on Surfaces
In 1996 Thomassen proved the conjecture made by R.B.Richter in 1991, that the graph genus problem for cubic graphs is NP-complete. Furthermore, we have obtained a relatively short proof of the deep result in the Robertson-Seymour theory that, for any fixed surface, there are only finitely many obstructions for the graph embedding problem in that surface. Since 1997, the work in this project has concentrated on the monograph on graphs on surfaces written in collaboration with Bojan Mohar, University of Ljubljana. This work is planned to be completed in 2000
Department of Mathematics
Period: 01/01/1996 → …
Number of participants: 2
Project Manager, organisational:
Thomassen, Carsten (Intern)
Mohar, B. (Ekstern)
Project

Guest list of IMM - 1996.
Benabdalla, Saint-Aignan, (France fra 1.5 til 30.6) Caputo, Jean-Guy, (Laboratoire de Mathematiques, INSA de Rouen,
France fra 22.1 til 22.5) Edlund, Ove, (Højskolen i Luleå, Sverige fra 20.8 til 27.9) Gaididai, Yuri, (Kiev, Ukraine, fra 6.3 til 6.6
og fra 27.9 til 15.11) Johansson, Magnus, Post.Doc., (Dept. of Physics, Linköping Univ., Sverige, støttet af The Swedish
Foundation for International Cooperation in Research and Higher Education) Kulikov, Gennady, (Ulyanovsk, Rusland fra
19.2 til 31.3) Kuznetsov, E. A., (Moscow fra 1.12 til 14.12) Mainer, David Usero, (Univ. of Auckland, New Zealand fra 16.8 til 24.8
Støttet af SNF og DTU) Tuszynski, Jack, (Canada fra 16.4 til 24.8) Zakharov, V., (Moscowa fra 2.12 til 8.12)

Department of Informatics and Mathematical Modeling
Period: 01/01/1996 → 31/12/1996
Number of participants: 1
Project Manager, organisational:
Madsen, Kaj (Intern)
Project

Gyroscopic Stabilization of Indefinitely Damped Systems
Modelling of mechanical systems with sliding bearings or with dry friction, can lead to linear systems with an indefinite
damping matrix. We ask under what conditions such a system is unstable (the indefinite property of the damping matrix
alone is insufficient) and under what conditions we can stabilize the system by adding a gyroscopic term.

Department of Mathematics
Period: 01/01/1996 → …
Number of participants: 3
Project participant:
Müller, Peter C. (Ekstern)
Freitas, Pedro (Ekstern)
Kliem, Wolfhard (Intern)
Project

High Resolution Medical Image Analysis in Acoustical Microscopy
A non-destructive method, scanning acoustic microscopy (SAM), is being developed for the purpose of tissue analysis and
characterisation of materials. The aim is resolution improvements and investigation of the passive elastic properties from
specimens of the abdominal aorta to study early stages of arteriosclerosis

Department of Mathematics
Aarhus University
Period: 01/01/1996 → …
Number of participants: 2
Project participant:
Poulsen, Jens Kristian (Ekstern)
Skovgaard, Ove (Intern)
Project

Holomorphic Dynamical Systems
In holomorphic dynamics one studies iteration of holomorphic maps, in particular polynomials. The dynamical space
typically the complex plane or the Riemann sphere is divided into the Fatou set, where the dynamics is stable, and the
Julia set where the dynamics is chaotic. The goal is not only to understand the topology and geometry of Julia sets of
individual holomorphic maps, but also to understand how the Julia set and the dynamics vary with the map, in particular
to understand bifurcation sets of maps where the dynamics change qualitatively. The scope of the project is broad. It
concentrates on describing special types of results and techniques, namely those for which a transfer of results is possible from dynamical spaces to parameter spaces, parametrizing families of holomorphic maps. For instance, results obtained using puzzles in dynamical spaces and para-puzzles in parameter spaces as a tool.

Department of Mathematics

University of Paris-Sud - University of Paris XI

Cornell University

University of Warwick

Universidad Autonoma de Barcelona

Period: 01/01/1996 → …
Number of participants: 5
Project participant:
Douady, Adrien (Ekstern)
Hubbard, John H. (Ekstern)
Lei, Tan (Ekstern)
Fagella, Nuria (Ekstern)

Project Manager, organisational:
Branner, Bodil (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 20,000.00 Danish Kroner

Homoclinic Bifurcation to Infinity
This project is concerned with investigations of the homoclinic bifurcation to infinity for spatially distributed systems. The resulting mathematical models are partial differential equations. Specific models of importance for biochemistry are investigated.

Department of Mathematics

Novo Nordisk A/S
Period: 01/01/1996 → …
Number of participants: 2
Project participant:
Sturis, Jeppe (Ekstern)

Project Manager, organisational:
Brøns, Morten (Intern)

Hypergeometric Series and Functions in One and Several Variables
Hypergeometric series and functions in one and several variables are studied in order to establish reducible cases, transformations, integral representations, regions of convergence and q-basic generalizations. Also, connections with certain applications are considered. Funding: MAT.

Department of Mathematics

Period: 01/01/1996 → …
Number of participants: 1
Project Manager, organisational:
Karlsson, Per W. (Intern)

Instability of Gyroscopic Systems
Mathematical models of mechanical systems exhibit instability if the stiffness matrices are indefinite. Under certain circumstances such systems may be stabilized by adding gyroscopic terms. The investigation includes specific systems (e.g. a simple model of a spaceship) as well as the mathematical behaviour of general systems in the vicinity of multiple eigenvalues.

Department of Mathematics
**Linear and Quadratic Programming**

A new type of method has been developed for positive definite problems. It is based on solving a dual problem which is an unconstrained minimization of a piecewise quadratic function. Finite convergence has been proved and an efficient implementation has been made.

**Loop Transfer Recovery**

Loop Transfer Recovery (LTR) is a general method for designing linear control systems. The idea is, that the demands to the dimensioning are formulated as frequency domain properties, by prescribing desired behaviours for a number of transfer functions in the control system. Traditionally, linear and quadratic optimization has been applied in connection with LTR design methods. However, it is by far more natural to define the final demands in H-infinity norm, since the final target almost always contains a specification of robustness, which is easily handled with H-infinity Theory. Through several publications it has been described how H-infinity Theory may be applied for this purpose in theory as well as in practice.
**Mathematical Modelling and Stability of Rotor Systems**
The dynamics of a large class of rotor systems can be modelled by linearized matrix differential equations in a complex setting. Such systems can exhibit instability due to internal damping, unsymmetrical steam flow or imperfect lubrication in the bearings. Stability limits are investigated by means of the Lyapunov matrix equation, in order to express stability by properties of the system matrices.

Department of Mathematics

Department of Applied Engineering Design and Production

Period: 01/01/1996 → …

Number of participants: 3

Project participant:

Stoustrup, Jakob (Intern)

Pommer, Christian (Intern)

Kliem, Wolfram (Intern)

**Measurement of short-circuit capacity**
The short-circuit capacity in the electric transmission and distribution system is important when connecting equipment to the network. In the transmission system, this could for example be connection of HVDC lines or very big consumers, and at lower voltage levels it could be minor power stations or other consumers. The short-circuit impedance is dependent on the actual configuration of the network, and of the consumption. This investigation concerns establishing methods for measuring the short-circuit impedance from naturally occurring variations in voltage and current. In particular two cases, where the measurements are presently requested are investigated. The first case is about the 400 kV bus in Bæverskov, where the short-circuit capacity should be known before start of the HVDC line to Germany. The second case is a measurement on the 132 kV bus in Hove, where a pronounced consumer is connected, and the problem is voltage fluctuations, for which reason the impedance measurement is combined with a flicker measurement. In the project, two pc-based measurement systems are developed. The first one with the sampling rate locked to the power frequency, and the second one with constant sampling rate. In the frequency locked system, the naturally occurring variations in voltage and current are collected and used as basis for a statistical analysis and an estimation of the short-circuit impedance. In the system with constant frequency data acquisition, the method includes an algorithm for detection of significant events in the variation of voltage and current.

Department of Electric Power Engineering

Department of Informatics and Mathematical Modeling

Period: 01/01/1996 → …

Number of participants: 3

Project participant:

Pedersen, Knud Ole Helgesen (Intern)

Poulsen, Niels Kjølstad (Intern)

Nielsen, Arne Hejde (Intern)

**Microlocal Analysis of Control Problems**
Considering a wave equation, it is interesting to study how the limit behaviour of the solutions (time approaching infinity), depends on various types of posed boundary conditions. This includes feedback boundary operators, which can provide exponentially damped solutions.

Department of Mathematics

Period: 01/01/1996 → …

Number of participants: 1

Project Manager, organisational:

Pedersen, Michael (Intern)

**Modelling of dispersion in the planetary boundary layer**
In this project a Lagrangian Stochastic Model (Random Walk Model) for dispersion of passive scalars in the planetary boundary layer (PBL) is developed.

Department of Mathematics
Models for Vibration Levels Caused by Railway Traffic
The project is concerned with developing models for estimating vibration levels caused by railway traffic. Estimates of vibration levels from passenger trains are found by two fundamentally different methods: 1) A neural network model. 2) A statistical model. The work is carried out in close cooperation with the industry.

Department of Mathematics
Department of Geology and Geotechnical Engineering
DSB Consult
Rambøll Danmark A/S

Geotechnical Institute
Period: 01/01/1996 → 01/04/1997
Number of participants: 2
Project participant:
Hansen, Bent (Intern)
Project Manager, organisational:
Skovgaard, Ove (Intern)

Multi Criterion Regulation
The literature on modern Theory of Regulation contains numerous publications concerned with the optimization based design of regulators based on specific criteria. However, a realistic design problem would rather contain a range of specifications. Hence, optimization based methods are to a large extent inapplicable, until it has been made possible to impose multiple specifications on the same control problem. Many control problems may be formulated with constraints on sensitivity functions and a number of results have been achieved for this kind of problems. The results within this area has in particular been applied in connection with active damping of rolling of ships by steering the rudder.

Department of Mathematics
Department of Automation
Period: 01/01/1996 → 31/12/1997
Number of participants: 2
Project participant:
Niemann, Hans Henrik (Intern)
Project Manager, organisational:
Stoustrup, Jakob (Intern)

Nonlinear optics
Soliton propagation and quasi phase matching in stochastic nonlinear media (of chi(3) and chi(2) type) is investigated. Publications (PLC, CBC, and MPS) refer to publication lists of P.L. Christiansen, C.B. Clausen, and M. P. Soerensen):

Department of Informatics and Mathematical Modeling
Department of Electromagnetic Systems
Department of Mathematics
Tele Danmark Research
Period: 01/01/1996 → …
Number of participants: 10
Project participant:
Sørensen, Mads Peter (Intern)
Numerical solutions of stochastic differential equations

A commonly used model for dispersion of a passive scalar in the atmospheric boundary layer is the Langevin Equation, which is a stochastic differential equation. In atmospheric sciences it is integrated by the stochastic Euler scheme, which has a very low order of convergence and thus is very time-consuming. In this project a higher-order scheme for numerical integration of the non-linear height-inhomogeneous Langevin Equation is developed.

Department of Mathematics
Period: 01/01/1996 → 31/12/1996
Number of participants: 1
Project Manager, organisational:
Falk, Anne Katrine Vinther (Intern)

On Accumulation of Stretching Rays - Cubic Polynomials with a Multiple Fixed Point

The project studies the parameter space for polynomials of degree k, where k is at least 3. More precisely, we study the boundary of the connectedness locus (the area in the parameter space, where the corresponding polynomials have a connected Julia set). A stretching ray is a real analytical curve in the complement of the connectedness locus. We are interested in the limiting behaviour of stretching rays when approaching the connectedness locus from the outside. Already a degree three polynomial with a multiple fixpoint exhibits interesting behaviour: An area in the boundary of the cubic connectedness locus has been found, where no stretching ray lands. The corresponding cubic polynomials are parabolic-attracting with both critical points in the immediate basin of the multiple fixpoint. We have established necessary conditions for the stretching ray through a polynomial to land in this area. The work is continued attempting to prove that stretching rays can land only on a specific graph in this area and that only a very special type of stretching rays can land on this graph. Keywords: Complex dynamical systems, parabolic cycles, stretching rays.

Department of Mathematics
Period: 01/01/1996 → …
Number of participants: 1
Project Manager, organisational:
Willumsen, Pia B.N. (Intern)

Optimal Solutions of Concave Differential Systems

We consider a system $x'=f(t,x)$ of n first order differential equations, where all coordinate functions are weakly concave in x and all off-diagonal entries in the Jacobi matrix are nonnegative, i. e., a cooperative system. We give a characterization of those initial points, for which the corresponding Poincare-mapping and some related mappings assume extreme values.

Department of Mathematics
Period: 01/01/1996 → …
Number of participants: 2
Project participant:
Andersen, Kurt Munk (Intern)
Optimization and power planning.
The project has concentrated on developing a new tool for power planning in Denmark. The goal has been to solve models with many time periods considering both power and energy aspects. The model developed has a quadratic objective function and linear constraints. The elements in the model include both power plants and the power network as well as natural gas contracts and constraints on the discharge of CO2. The solution method implemented is based on interior point methods and the results obtained so far seem very promising.

Department of Informatics and Mathematical Modeling
Elsam A/S
Period: 01/01/1996 → 31/12/1999
Number of participants: 2
Project participant:
Ravn, Hans V. (Intern)
Project Manager, organisational:
Madsen, Oli B.G. (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 500,000.00 Danish Kroner
Source: Unknown
Name of research programme: Ukendt
Amount: 500,000.00 Danish Kroner

Parallel Methods for Unconstrained Optimization
The implementation of parallel versions of the quasi-Newton and the Gauss-Newton methods continues. A parallel equation solver has been incorporated.

Department of Informatics and Mathematical Modeling
Period: 01/01/1996 → 01/10/1998
Number of participants: 1
Project Manager, organisational:
Tingleff, Ole (Intern)

Percolative Flow in a Melting Medium
A mathematical model of the flow of water in a melting layer of snow is being worked out. During melting an instability, the nature of which is unknown, appears to develop. The ultimate purpose is to explain why a wavy surface shape, which can be observed, develops.

Department of Mathematics
University of Western Ontario
Period: 01/01/1996 → …
Number of participants: 2
Project participant:
Rasmussen, Henning (Ekstern)
Project Manager, organisational:
Hansen, Erik Bent (Intern)

Prediction models for wind energy production
During the recent years the number of wind mills in Denmark has increased dramatically. The amount of electricity produced by wind mills is now considerable compared to what is produced by other sources, and it is necessary to take this amount into consideration in the production planning. This is in particular the case for the areas Funen and Jutland where ELSAM is responsible for the production and delivery of electricity. Due to rather large startup periods for some production units it is advantageous to estimate the amount of wind energy up to about 36 hours ahead. In this project statistical methods for predicting the wind energy for the ELSAM area 36 hours ahead are developed. The methods are
based on actual measurements from 7 wind mill parks distributed across the area. Methods for taking meteorological forecasts into the model are developed. Also models for on-line detection and correction of errors in the data are formulated. All the models are implemented with a graphical user interface, and the results will be used in the daily production planning at ELSAM. An off-line version of the program is developed for a distribution company called SEP in Holland.

Department of Informatics and Mathematical Modeling
ELSAM A/S

SEP
Period: 01/01/1996 → 31/12/1998
Number of participants: 4
Project participant:
Nielsen, Torben Skov (Intern)
Søgaard, Henning (Ekstern)
Sejling, Ken (Ekstern)
Project Manager, organisational:
Madsen, Henrik (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 301,500.00 Danish Kroner

Propagation and scattering of electromagnetic waves
Within the area of propagation and scattering of linear waves the Institute's research is focused on classical applications of electromagnetic theory (antennas, waveguide, diffusive theory etc.) These problems are inated with both analytical and numerical methods. Analytical methods include eg. Wiener-Hopf technique, while the numerical methods typically are integral equations and the Geometrical theory of Diffraction (GTD) combined with complex ray optics

Department of Informatics and Mathematical Modeling
Danish College of Pharmacy Practice
Period: 01/01/1996 → 31/12/1999
Number of participants: 3
Project participant:
Rootzén, Helle (Intern)
Herborg, Hanne (Ekstern)
Project Manager, organisational:
Ersbøll, Bjarne Kjær (Intern)

Quality Improvement of Drug Therapy for Asthma Patients - Evaluation of a Co-operative Danish Programme
Drug therapy is an essential in managing asthma. In spite of increased possibilities in asthma management (eg. peak-flow meters and patient diaries) and the existence of improved anti-asthmatic drugs, the morbidity and mortality of asthma have not improved in Denmark. The purpose of this Therapeutic Outcomes Monitoring project is to establish therapeutic outcomes monitoring as a continuous quality improvement activity for the medication use process among asthma patients in primary health care. To evaluate the experiment in pharmacy practice we use a combined evaluation strategy which is composed of (i) a controlled effect study, (ii) a process- and participant evaluation, (iii) a health economical analysis, and (iv) a qualitative ingerview study.

Department of Informatics and Mathematical Modeling

Quantification of enzymatic effect

Department of Informatics and Mathematical Modeling
**Reconstruction of Surfaces for Reverse Engineering**

Whereas conventional engineering uses CAD/CAM systems to create real parts, reverse engineering transforms a real part into a computer model, in particular it develops a CAD model of the part. In this project, we deal with problems that arise in the context of reverse engineering of geometric models. The surface of a part may consist of different surface types. There might be simple surfaces like planes, spheres, cones and cylinders of revolution and tori. It might also contain more general surfaces of revolution, general cylinders, helical and spiral surfaces, and it might exhibit general freeform surfaces. Both for the CAD representation and for the manufacturing of the part, it is essential to recognize the simpler surface types and fit the given data, usually clouds of points with measurement errors, by surfaces of the determined type.

**Reduction methods for Partial Differential Equations**

Rotating flows connected with vortex breakdown are investigated with proper orthogonal decomposition (POD), based on a numerical solution of the Navier-Stokes equations.

**Reliability of Repairable Systems.**

The traditional theories for reliability of electronic components has turned out to be insufficient in describing the lifetime conditions for repairable systems, that is reinstalled in production after repair. The project seek to develop statistical models, that can be used to describe the reliability of repairable systems.
Robust adaptive control

The goal in this project is to investigate and develop robust identification methods and adaptive controllers. The practical application is related to steering of ships (autopilots). Adaptive control is interesting in connection to ships, because these strategies are able to handle time-varying systems operating under unpredictable situations. In the period there has been focussed on model reduction in order to obtain reasonable models suitable for control design. In the project there has been developed and investigated methods for designing predictive controllers, which in the design procedure take the restriction into account. Classical system identification is based on the models ability to predict one step ahead. This ability is not necessarily connected to the control objective and methods for connecting control and system identification has been investigated.

Department of Informatics and Mathematical Modeling
Period: 01/01/1996 → ...
Number of participants: 2
Project participant:
Hansen, Anca Daniela (Intern)
Project Manager, organisational:
Poulsen, Niels Kjølstad (Intern)

Robust Regulation of Systems with Infinite Dimensions

Infinite dimensional systems usually arise from models involving partial differential equations or time delays. Robust control is concerned with controller design based on mathematical models, where the inevitable modeling errors are taken into account during the design phase. In robust control one specifies a model which in a certain sense approximates the physical plant to be controlled. Based on the approximating model a feedback control law is developed, which is satisfactory for a set of models, that in a certain sense are close to this model. This project considers the so-called H-infinity method, which is generally considered as an important method for robust control of finite dimensional systems. However, in the infinite dimensional case the method is not yet fully developed. As a case study the robust control of a pasteurization plant is considered.

Department of Mathematics
Period: 01/01/1996 → 31/03/1997
Number of participants: 1
Project Manager, organisational:
Larsen, Mikael (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 303,857.00 Danish Kroner

Shoulder Muscle Forces during Work

Work with human hands and arms imply a live load of the muscles in the shoulder. In the project several methods to determine the live load on shoulder muscles have been developed for different situations with the aim of minimizing the static load when designing a work place. The work is carried out in cooperation with Bjørn Laursen and Gisela Sjøegaard, both at the National Institute of Occupational Health, Denmark.

Department of Mathematics
Period: 01/01/1996 → 01/11/1996
Number of participants: 1
Project Manager, organisational:
Skovgaard, Ove (Intern)

Shoulder Muscle Forces during Work

Work with human hands and arms imply a live load of the muscles in the shoulder. In the project several methods to determine the live load on shoulder muscles have been developed for different situations with the aim of minimizing the static load when designing a work place. The work is carried out in cooperation with Bjørn Laursen and Gisela Sjøegaard, both at the National Institute of Occupational Health, Denmark.

Department of Mathematics
Period: 01/01/1996 → 01/11/1996
Number of participants: 1
Project Manager, organisational:
**Stability Problems for Frames**
A frame can be considered as an overcomplete basis, in the sense that the constituent elements may be linear dependent.

The aim of this project is to pose criteria, ensuring that the frame properties are conserved under small perturbations. This is not of theoretical interest only, but do also have considerable practical importance, since the formation of an actual frame is often based on measurements, where uncertainties may be significant.

Department of Mathematics  
Period: 01/01/1996 → …  
Number of participants: 1  
Project Manager, organisational: Christensen, Ole (Intern)

**Stagnation Points in Point Vortex Flows**  
This project is concerned with a description of the stagnation points and the streamline topology in a flow generated by few point vortices. Some classical results from algebraic geometry find a surprising application here.

Department of Mathematics  
University of Illinois at Urbana-Champaign  
Period: 01/01/1996 → …  
Number of participants: 2  
Project participant: Aref, Hassan (Ekstern)  
Project Manager, organisational: Brøns, Morten (Intern)

**Statistical methods in standardization.**  
The purpose of the project is to develop procedures and guidelines for utilizing statistical ideas and statistical methods in standardization work. The project covers as well statistical procedures for assessment of the uncertainty of test methods, procedures for conformity assessment, as statistical methods for improving quality and productivity.

Department of Informatics and Mathematical Modeling  
Period: 01/01/1996 → …  
Number of participants: 1  
Project Manager, organisational: Thyregod, Poul (Intern)

**Strategy and Climate Change**  
Application of Soft and Multicriteria methods to develop strategies to cope with the problems of climate change in Peru

Department of Informatics and Mathematical Modeling  
Rise National Laboratory  
CONAM, President Office  
Period: 01/01/1996 → 30/12/1998  
Number of participants: 2  
Project participant: Borges, Pedro Manuel F. C. (Intern)  
Project Manager, organisational: Vidal, Rene Victor Valqui (Intern)

**Subgroup Subcodes**  
The advantage of a subgroup subcode is that one can adjust the symbols in a codeword to match the byte-size of the computer. Or it is a way to construct long codes. In this project we study the fundamental properties of subgroup subcodes. It has been demonstrated that high rate subgroup subcodes are among the best known codes.
The Mobius Strip Embedding Problem

We present necessary and sufficient conditions for a curve to be the center curve of an analytic and flat embedding of the Mobius strip (or an orientable cylinder) into euclidean 3-space. Using these conditions we extend an example by G. Schwarz into a continuous family of analytic and flat Mobius strips. This family is split into two connected components. We give a topological argument that explains this behaviour. A connection to the work of C. Chicone and N.J. Kalton on the Mobius strip embedding problem, suggests a close relation between a linking number and the total torsion of the orthogonal axes of a Mobius strip or an orientable cylinder.

Department of Mathematics
Period: 01/01/1996 → 01/10/1996
Number of participants: 4
Project participant:
Markvorsen, Steen (Intern)
Randrup, Thomas (Intern)
The Riemannian Recognition Programme
Typical examples of metric invariants which are instrumental for the global description of Riemannian manifolds and Alexandrov spaces are diameter, volume, curvature bounds etc. In this project we investigate several interesting invariants of this type and decide their importance for the inverse problem of recognizing a space metrically or topologically from a given list of such invariants.

Department of Mathematics
University of Maryland
Period: 01/01/1996 → …
Number of participants: 2
Project participant:
Grove, K. (Ekstern)

The Shape of a Fluid Interface in a Moving Tube
The shape of the interface between two fluids in a tube, which is easily found in the static case, is changed (and unknown) if the tube moves through the interface. The free boundary problem to find the shape is formulated as an integral equation, to be solved numerically, in the Stokes approximation

Department of Mathematics
Period: 01/01/1996 → …
Number of participants: 1
Project Manager, organisational:
Hansen, Erik Bent (Intern)

Vehicle routing with time windows.
The purpose of the project is to develop and test optimal solution methods to vehicle routing problems with customer time windows. A method based on Dantzig-Wolfe decomposition, generation of valid inequalities, and branch and bound is developed. The results are very promising and the algorithm turns out to be faster than other algorithms considered in the literature, and several previously unsolved problems has been solved to optimality. For the time being we are improving the branch and bound procedure and implementing a parallel branch and bound.

Department of Informatics and Mathematical Modeling
Period: 01/01/1996 → …
Number of participants: 3
Project participant:
Larsen, Jesper (Intern)

Wavelets and Frames
Wavelets is currently gaining a lot of attention within signal processing. The transformation of wavelets provides simultaneous time/frequency analysis, where the problem with the well known Fourier transform is, that time information is lost. An important ingredient in wavelets are the so-called frames. Lately a number of articles considering theoretical aspects of frames has emerged. The purpose of this project is to contribute to this development. Previous results of the project includes time/frequency analysis seen from a group theoretical point of view as well as the connection between frames and a classical moment problem.

Department of Mathematics
Period: 01/01/1996 → …
Number of participants: 1

**Weierstrass Polynomials for Links**

There is a natural way of identifying knots and links in 3-space with covering spaces defined as zero sets for parametrized families of complex polynomials over the circle (polynomial covering spaces over the circle). The geometrical objects mentioned can all be constructed by closing a braid around an axis in 3-space. Polynomial invariants are very important in the study of knots and links. However, polynomials of Weierstrass type, as above, have not been considered in the earlier studies. In the present project these connections are examined.

Department of Mathematics  
Period: 01/01/1996 → …  
Number of participants: 1  
Project Manager, organisational:  
Hansen, Vagn Lundsgaard (Intern)

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**Yielding Capacities for Control Systems with Uncertain Parameters**

Modelling physical and dynamical systems there will inevitably be a discrepancy between the model and the real system. Sometimes even minor discrepancies may have serious consequences for certain desired properties. The present project considers input/output characteristics for these type of systems, allowing nonlinear uncertainties on the parameters. Results have been established, which for certain classes of systems provide explicit expressions for the largest allowable deviations, considering quadratic norm conditions on the input/output properties.

Department of Mathematics  
Department of Automation  
Period: 01/01/1996 → 31/12/1997  
Number of participants: 2  
Project participant:  
Niemann, Hans Henrik (Intern)  
Project Manager, organisational:  
Stoustrup, Jakob (Intern)

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**Diffraction of an electromagnetic field by a quarterplane**

It has remained a Challenge in electromagnetic diffraction theory to solve the problem of scattering around a perfectly conducting quarterplane. In this project the solutions to the scalar problems (for a hard and soft quarterplane) are used to obtain the electromagnetic solution to the scattering of the field from a halfwave dipole around a quarterplane.

Department of Informatics and Mathematical Modeling  
Period: 01/12/1995 → …  
Number of participants: 1  
Project Manager, organisational:  
Albertsen, Niels Christian (Intern)

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**Signalbehandling anvendt til overvågning af distributionsnet**

Department of Informatics and Mathematical Modeling  
Period: 01/12/1995 → 01/03/1996  
Number of participants: 4  
Phd Student:  
Thomsen, Henrik (Intern)  
Supervisor:  
Lind, Morten (Intern)  
Munk, Steen M. (Intern)  
Main Supervisor:  
Sørensen, John Aasted (Intern)

**Financing sources**

Source: Internal funding (public)
Calling in vehicles for inspection.
In 1998 and the following years all cars which are more than three years old must be inspected by the Danish Car Inspection (Statens Bilinspektion) every second year. Therefore the Danish Car Inspection needed to know how, when and where should the cars be called in for inspection and which capacity was necessary. To answer these questions we developed a large aggregated optimization model. The results from the model was used by the management of the Danish Car Inspection to make decisions concerning the overall structure of the future process for car inspection.

Department of Informatics and Mathematical Modeling
Statens Bilinspektion
Period: 01/11/1995 → 31/05/1996
Number of participants: 3
Project participant:
Larsen, Allan (Intern)
Rygaard, Jens Moberg (Intern)
Project Manager, organisational:
Madsen, Oli B.G. (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 105,000.00 Danish Kroner

CoFI
CoFI (Common Framework Initiative) is an international project with participants from most major groups working on algebraic specification. The goal of the initiative is to design a common framework for algebraic specification. The rationale behind is that the lack of such a framework hinders the dissemination and application of research results in algebraic specification. CoFI will provide a family of specification languages, a development method and tool support. The project was partly supported by STVF under the "Codesign" program 1996-1997, and by the ESPRIT CoFI WG 1998-2001.

Department of Information Technology
Department of Informatics and Mathematical Modeling
Aarhus University
University of Bremen
Period: 01/11/1995 → 31/12/2003
Number of participants: 38
Project participant:
Mosses, Peter (Ekstern)
Lescanne, Pierre (Ekstern)
Astesiano, Egidio (Ekstern)
Bergstra, Jan (Ekstern)
Bert, Didier (Ekstern)
Bidoit, Michel (Ekstern)
Bettaz, Mohammed (Ekstern)
Broy, Manfred (Ekstern)
Chopy, Christine (Ekstern)
Dahl, Ole-Johan (Ekstern)
Ehrich, Hans-Dieter (Ekstern)
Ehrig, Hartmut (Ekstern)
Fiadeiro, Jose (Ekstern)
Gaudel, Marie-Claude (Ekstern)
Goguen, Joseph A. (Ekstern)
Grosu, Radu (Ekstern)
Heering, Jan (Ekstern)
EUROPRACTICE (I)
EUROPRACTICE replaced EUROCHIP October 1st, 1995, giving service in 5 important Microelectronics areas. One important area relevant to analog design is Training and Best Practice Service (TBPS) responsible for training in all 5 areas. TBPS has made a large investigation of industrial need for analog training. The result was that analog is increasing. Means have been taken to fulfil this.

Department of Information Technology
Department of Informatics and Mathematical Modeling
T WI
CNMF
COREP

CNM
Period: 01/10/1995 → 30/09/1997
Number of participants: 4
Project participant:
Andersen, Anders C. (Intern)
Høvring, Hanne Nielsen (Intern)
Berthelsen, Vibeke (Intern)

Project Manager, organisational:
Olesen, Ole (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 5,587,000.00 Danish Kroner

Project
A network model of oil/water flow
One of the techniques of oil recovery involves the displacement of oil from the reservoir by the injection of water. The flow of oil and water in this process can be simulated by a network model consisting of a regular lattice of pores connected by throats. The model is nonlinear due to capillary forces that block the flow between neighboring pores of different phases under certain conditions. This project is concerned with the mathematical properties of the model and its numerical solution.

Department of Informatics and Mathematical Modeling
Period: 15/09/1995 → 31/12/1996
Number of participants: 1
Project Manager, organisational:
Barker, Vincent A. (Intern)

Design and Engineering of Double Curved Ship Surfaces
The objective of the project is to invent new mathematical methods for the design of ship surfaces. These methods should take into account the actual processes at a shipyard; rolling and heating. In the production the developed (plane) surface is by rolling turned into a single-curved plate, mostly, cylinder shaped. Henceforth, heating is applied to deform it to its final shape. The first part of the project is to find the developed shape, such that after the rolling process the obtained developable surface is closest to the desired final shape thereby minimizing the heat input. The second part consists of modelling the heating process in geometrical terms.

Department of Mathematics
Number of participants: 2
Project participant:
Gravesen, Jens (Intern)
Project Manager, organisational:
Randrup, Thomas (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 596,700.00 Danish Kroner

Konstruktion af flader i computer assisteret geometrisk skibsdesignsk design (GAGD) via Gauss-afbildningen

Department of Mathematics
Number of participants: 5
Phd Student:
Randrup, Thomas (Intern)
Main Supervisor:
Gravesen, Jens (Intern)
Examiner:
Dæhlen, Morten (Ekstern)
Jensen, Jørgen Juncher (Intern)
Perram-John, William (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Erhvervsforskerordningen
Project: PhD

Microlocal Analysis of Control Problems
Microlocal analysis and the propagation of singularities provides necessary and sufficient conditions for exact controllability for a linear system - even for very complicated geometries. This project treats approximative control exploiting the good geometric description provided by microlocal analysis. That is, to find a measure for the quality of an approximate control as well as geometrical conditions for the existence of a sufficiently 'good' control.
Mikrolokal analyse i scattering teori og anvendelser, specielt med henblik på kontrol f partielle differentialligninger

Department of Mathematics
Period: 01/09/1995 → 08/02/1999
Number of participants: 3
Phd Student:
Binzer, Knud Andreas (Intern)
Main Supervisor:
Pedersen, Michael (Intern)
Examiner:
Sørensen, Mads Peter (Intern)
Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsstip.-SU, Eksp
Project: PhD

Nonlinear Geometrical Optics
Linear geometrical optics describe the propagation of waves with high frequency as the propagations of rays and supplies an approximate solution. The approximate solution is considerably easier to evaluate numerically, than the actual solution to the partial differential equation. For nonlinear phenomena there exists a number of studies and heuristics, while the development of a stringent theory is still only commencing. For instance, the exponential functions in the linear approximation need to be replaced by more general ‘profiles’ in order to take the creation of harmonics into account.

Department of Mathematics
Number of participants: 1
Project Manager, organisational:
Binzer, Knud Andreas (Intern)
Project

Optimality and Robustness of Stochastic Adaptive Controllers

Department of Informatics and Mathematical Modeling
Period: 01/09/1995 → 11/01/1999
Number of participants: 4
Phd Student:
Thygesen, Uffe Høgsbro (Intern)
Main Supervisor:
Poulsen, Niels Kjølstad (Intern)
Examiner:
Madsen, Henrik (Ekstern)
Perram-John, William (Ekstern)
Financing sources
Source: Internal funding (public)
Name of research programme: DTU-Su Stipendium, Eksp
Project: PhD

Parallel beregning af roterende strømninger

Department of Informatics and Mathematical Modeling
Period: 01/09/1995 → 23/02/1999
Number of participants: 4
Phd Student:
Lundin, Lars Kristian (Intern)
Supervisor:
Sørensen, Jens Nørkær (Intern)
Main Supervisor:
Barker, Vincent A. (Intern)
Examiner:
Meyer, Stefan (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Program Stipendium-SU, Eksp
Project: PhD

Research visit at Bell Communications Research
Department of Informatics and Mathematical Modeling
Bell Communications Research Inc.
Period: 01/09/1995 → 31/08/1996
Number of participants: 2
Project participant:
Ramaswami, V. (Ekstern)
Project Manager, organisational:
Nielsen, Bo Friis (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 133,390.00 Danish Kroner
Project

Statistiske metoder til vurdering af kontrol af kemiske referencematerialer
Department of Informatics and Mathematical Modeling
Period: 01/09/1995 → 04/05/1999
Number of participants: 4
Phd Student:
Schramm-Nielsen, Karina Edith (Intern)
Supervisor:
Hansen, Elo Harald (Intern)
Main Supervisor:
Spliid, Henrik (Intern)
Examiner:
Vølund, Aage (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-Su Stipendium, Eksperiment
Project: PhD

Fluid dynamics: Ventilation of livestock buildings
Project no. 1153 Ph.D. project: Danish Research Academy Ph.D. Student: Jens Chr. Bennetsen A theoretical model of airflow in livestock buildings is being developed. The model is 3-dimensional. Computer simulations will also be carried out in 2 D's and compared to experimental results for a 2D-model. Publication (PLC refers to P.L.Christiansens's publication list): PLC16
Department of Informatics and Mathematical Modeling
Department of Energy Engineering
Research Center Bygholm
Caspar Wessel and the Complex Numbers
In 1797 a paper by the Norwegian surveyor Caspar Wessel was presented to the Royal Danish Academy of Sciences and Letters. In this paper he introduced the geometrical representation of complex numbers. From his surveying reports we know that he had the idea at least as early as 1787. A biography relating his mathematical paper to his work as surveyor under the auspices of the Academy will appear in a book, edited by Jesper Lutzen, and published by the Academy in 1998.
Control of Partial Differential Equations
The aim of this project is to study the control of systems described by bilinear and semilinear partial differential equations (PDEs). These PDEs could for example describe the propagation waves or the temperature profile of a body. Controllability is the property of being able to drive a system to a desired state in finite time. The essential ingredient in the analysis of controllability problems is obtaining estimates for the energy of these systems. These energy estimates are then combined with the Hilbert Uniqueness Method, Fixed Point Theorems and the Generalized Inverse Function Theorem in order to obtain controllability results.

Development of methods for evaluation of electricity saving and load levelling measures
The purpose of the project is to (i) develop and test methods for analysis of the dependence of the electricity power consumption on factors (possibly) affecting the consumption, (ii) develop and test methods for the planning and execution of relatively small trials concerning power conservation campaigns, and (iii) develop methods for estimation of the effect of power conservation campaigns, based on trial data. The results of the project have been published as two reports, both listed under the title of this project.
Department of Informatics and Mathematical Modeling

NESA A/S

Elkraft A.m.b.A.
Period: 01/03/1995 → 31/12/1997
Number of participants: 3
Project participant:
Nielsen, Henrik Aalborg (Intern)
Bergstrøm, Willy (Ekstern)
Project Manager, organisational:
Madsen, Henrik (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 300,000.00 Danish Kroner

Rekonstruktion og segmentering af PET-scan data

Department of Informatics and Mathematical Modeling
Period: 01/03/1995 → 16/06/1999
Number of participants: 5
Phd Student:
Philipsen, Peter Alshede (Intern)
Supervisor:
Svarer, Claus (Ekstern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Holm, Søren (Intern)
Sørensen, Helge Bjarup Dissing (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-Su Stipendium, Eksperiment
Project: PhD

Styring af systemer beskrevet ved ikke-lineære partielle differentialeligninger

Department of Mathematics
Period: 01/03/1995 → 14/10/1998
Number of participants: 3
Phd Student:
Krishnaswamy, Vijayaraghavan (Intern)
Main Supervisor:
Pedersen, Michael (Intern)
Examiner:
Madsen, Henrik (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-Su Stipendium, Eksperiment
Project: PhD

EPOS: Efficient Parallel algorithms for Optimization and Simulation
The goal is to develop efficient and reliable parallel algorithms that can utilize supercomputers for solving large-scale optimization and simulation problems.

Department of Informatics and Mathematical Modeling
Fluid Mechanics

Department of Mechanical Engineering

UNI-C

Period: 03/02/1995 → …
Number of participants: 10
Project participant:
Clausen, Jens (Intern)
Barker, Vincent A. (Intern)
Hansen, Per Christian (Intern)
Madsen, Oli B.G. (Intern)
Nielsen, Hans Bruun (Intern)
Thomsen, Per Grove (Intern)
Sørensen, Jens Nørkær (Intern)
Wasniewski, Jerzy (Ekstern)
Other:
Caprani, Ole (Ekstern)
Project Manager, organisational:
Madsen, Kaj (Intern)

Financing sources
Source: Unknown
Name of research programme: Undertogt
Amount: 5,758,000.00 Danish Kroner
Project

Bayesiansk signalbehandling og fortolkning af PET-scan

Department of Informatics and Mathematical Modeling

Period: 01/02/1995 → 06/05/1998
Number of participants: 4
Phd Student:
Kjems, Ulrik (Intern)
Supervisor:
Larsen, Jan (Intern)
Svarer, Claus (Ekstern)
Main Supervisor:
Hansen, Lars Kai (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-Su Stipendium, Eksperiment
Project: PhD

Lænker og knuder i differential-geometrisk perspektiv

Department of Mathematics

Period: 01/02/1995 → 14/04/1999
Number of participants: 3
Phd Student:
Røgen, Peter (Intern)
Main Supervisor:
Hansen, Vagn Lundsgaard (Intern)
Examiner:
Gravesen, Jens (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-Su Stipendium, Eksperiment
Project: PhD
**Metaheuristics and Planning**
Application of simulated annealing and tabu search to solve real-life combinatorial optimization problems. The fields of interest are: - planning of examinations - design of tele-networks, and - target radar allocation.

Department of Informatics and Mathematical Modeling

Department of Telecommunication

Ministry of Education
Period: 01/02/1995 → 30/12/1999
Number of participants: 3
Project participant:
Hansen, Michael Pilegaard (Intern)
Borges, Pedro Manuel F. C. (Intern)
Project Manager, organisational:
Vidal, Rene Victor Valqui (Intern)

**On Chromatic and Geometrical Calibration. Project no.: 1219, Ph.D-student Jørgen Folm-Hansen.**
Project no.: 1219 Financed By: DTU

Department of Informatics and Mathematical Modeling
Period: 01/02/1995 → 31/01/1999
Number of participants: 2
Project participant:
Folm-Hansen, Jørgen (Intern)
Project Manager, organisational:
Conradsen, Knut (Intern)

**Ph.D. Project: Bayesian Signal Processing and Interpretation of Brain Scans**
This Ph.D.-project is about digital image processing of three-dimensional functional and anatomical image volumes of the human brain. Several approaches are investigating for improvement of the functional analysis. A problem in activation studies involving multiple subjects is the individual anatomical variation. This variation can be minimized by performing normalizing "warping" of the anatomy. Another approach investigated is noise reduction in PET activation images using Prior models for random fields. Parameter estimation in these random fields is of particular interest.

Department of Informatics and Mathematical Modeling
Period: 01/02/1995 → 01/03/1998
Number of participants: 3
Project participant:
Larsen, Jan (Intern)
Kjems, Ulrik (Intern)
Project Manager, organisational:
Hansen, Lars Kai (Intern)

**Visualisering af funktionel konnektivitet i den menneskelige hjerne. Statistisk analyse af PET-billeder**

Department of Informatics and Mathematical Modeling
Period: 01/02/1995 → …
Number of participants: 3
Phd Student:
Mørch, Niels J.S. (Intern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Larsen, Jan (Ekstern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: Forskerakademiets Samfinansier
Project: PhD

**Algorithms and Software for Rank-Revealing Decompositions**
Research co-operation, sponsored by a NATO Collaborative Research Grant.

Department of Informatics and Mathematical Modeling

California State University
Period: 01/01/1995 → 31/12/2000
Number of participants: 2
Project participant:
Fierro, Ricardo D. (Ekstern)
Project Manager, organisational:
Hansen, Per Christian (Intern)

**Anvendelse af stokastiske differentialligninger i biometri.**
De klassiske modeller for biologisk nedbrydning af stoffer antager et forløb, der følger en eller flere sammenhoerende differentialligninger med faste og tidsuafhængige koefficienter. I praksis ses imidlertid et forløb, der nok er kontinuert, men mere tilfældigt og desuden er overlejret med maalestøj. Projektets formaael er saaledes at beskrive de tilfældige variationer i nedbrydningsforløbet ved hjælp af stokastiske differentialligninger samt at identificere maalestøjen.

Department of Informatics and Mathematical Modeling
Period: 01/01/1995 → 31/12/1999
Number of participants: 3
Project participant:
Spliid, Henrik (Intern)
Wang, Chunyan (Ekstern)
Project Manager, organisational:
Rootzén, Helle (Intern)

**Biologisk vækst i multikomponentsystemer.**
Der betragtes multikomponentsystemer af organiske stoffer, hvor de enkelte stoffer kan nedbrydes af en eller flere grupper af mikroorganismer. Der skal saaledes opstilles en model der beskriver omsætningen af stoffer. Ligningsystemets strukturelle karakter antages at være kendt og problemet bestaar saaledes i at estimere de ukendte parametre, der indgår i differentialligningerne. Desuden behandles problemer vedr. observerbarhed. Konkret er formaaetet at bedre forståelsen af de grundlæggende biologiske og reaktionskinetiske forhold, der bestemmer omsætningen af mono aromatiske hydrocarboner (MAH) i grundvand, saaledes at der skabes basis for en biologisk baseret oprensningsteknik for MAH-forurenet grundvand.

Department of Informatics and Mathematical Modeling
Department of Environmental Science and Engineering
Period: 01/01/1995 → 31/12/1999
Number of participants: 4
Project participant:
Spliid, Henrik (Intern)
Sommer, Helle Mølgaard (Intern)
Arvin, Erik (Intern)
Project Manager, organisational:
Rootzén, Helle (Intern)

**Coding in Data Transmission**
Coding problems related to concatenated codes are studied in cooperation between the Department of Telecommunication and the Department of Mathematics, DTU, and Institute of Electronic Systems, AAU. This work has been supported by the Danish Research Council, STVF, since 1991. Various activities are listed as separate projects.

Department of Telecommunication
Concentration-Dependent changes of PCB Patterns in Fish-Eating Mammals
Data on chlorobiphenyls (CB's) in fish-eating mammals from five laboratories are combined to test and refine a pharmacokinetic model for the capacity of marine mammals to metabolize CB's. The study covers data on otter, harbour porpoise, common dolphin, harbour and grey seal. The marine mammal samples originated from the coasts of the British Isles, the Netherlands and Denmark. Otter samples originated from The Netherlands, Denmark, Austria and the Czech Republic. The main purpose of the project has been to relate observed differences in CB patterns between species to differences in biotransformation capacity. Publ.: Arch. Environ. Contam. Toxicol. 33, 298-311 (1997).
Faktorforøeg med funktionelt respons.  

Department of Informatics and Mathematical Modeling  
Periode: 01/01/1995 → 31/12/1999  
Antal deltagere: 3  
Projektleder:  
Spliid, Henrik (Intern)  
Sommer, Helle Mølgaard (Intern)  
Rootzén, Helle (Intern)  

High Temperature Superconductivity  
The Bardeen, Cooper and Schrieffer (BCS) approach is used to investigate the influence of anisotropy on the superconducting state in heavy fermionic systems or in the high-Tc oxide superconductors. We investigate the influence of anisotropy and nonlinearity on physical properties as the electron specific heat, the spin susceptibility, and Josephson tunelling. The moment approach has been used to calculate the single particle spectral functions for the Tj-model of a high-Tc superconductor. Within the framework of a mean field theory the energy gap is calculated together with spin-susceptibility and electron heat capacity. The results comply with cluster calculations.

Department of Informatics and Mathematical Modeling  
Universidade Federal Fluminense  
Periode: 01/01/1995 → …  
Antal deltagere: 3  
Projektleder:  
Rodriguez-Nunez, J.J. (Ekstern)  
Lazarides, N. (Ekstern)  
Sørensen, Mads Peter (Intern)  

Implementing Short Term Predictions at Utilities  
The purpose of the project is to investigate possible prediction models for wind power in a larger area using on-line measurements from selected wind farms and meteorological forecasts of weather variables. The resulting models are implemented in a software tool for on-line wind power predictions - WPPT - and tested at utilities (ELSAM and ELTRA).

Department of Informatics and Mathematical Modeling  
Risø National Laboratory  
Danish Meteorological Institute  
Elsam A/S  
OEM Development Corp.  
National Observatory of Athens  
University of Athens  
Elkraft A.m.b.A.  
Rutherford Appleton Laboratory  
Periode: 01/01/1995 → 31/12/1998  
Antal deltagere: 3  
Projektleder:  
Nielsen, Torben Skov (Intern)
Incidence of clubfoot in Frederiksborg County, Denmark.
The incidence of congenital clubfoot in Frederiksborg County, Denmark, was studied over a period of 16 years (1979-1994). Altogether 60,186 living infants were born, and of these 72 had a congenital clubfoot. Twenty-five children (35%) had bilateral clubfoot and 54 (75%) were boys. The overall incidence was 1.20 per thousand children. The incidence increased significantly during the observation period and was 2.41 per thousand in 1994. We cannot explain the rising incidence. The statistical analysis is made on the base of the theory for generalized linear models.

Department of Informatics and Mathematical Modeling
Hillerød Sygehus
Period: 01/01/1995 → 31/12/1997
Number of participants: 2
Project participant:
Andersen, Mikkel O. (Ekstern)
Project Manager, organisational:
Rootzén, Helle (Intern)
Project

Matematiske metoder til validering af jernbanesikringsanlæg
Department of Informatics and Mathematical Modeling
Period: 01/01/1995 → 25/01/1999
Number of participants: 3
Phd Student:
Petersen, Jakob Lyng (Intern)
Main Supervisor:
Rischel, Hans (Intern)
Examiner:
Hansen, Michael Rygaard (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Anden Offentlig Finansier-SU
Project: PhD

Statistical Treatment of Ecotoxicological Data based on Hazard Modelling
When characterising complex chemical pollution i.e. pesticide polluted groundwater or testing the effects of chemical compounds on the environment, ecotoxicological tests are of great value. This is due to their sensitivity and their expression of the overall toxicity. Since environmental pollution is increasing it is judged that ecotoxicological assays will have increasing impact on the toxicity- and risk assessment of environmental pollution. Evaluating results from ecotoxicological tests inevitably include estimation of dose-response relations. Conclusions about toxicity of the pollution or tested chemicals are summarised in characteristics extracted from the dose-response relationship. A revision of the statistical methods for extracting these measures has been internationally recommended by the scientific community. The dose/time-response models used are based on biological considerations, the key assumption is that the hazard rate is proportional to the concentration of the chemical compound in the animal as far as it exceeds the no-effect level. The uptake dynamics are described by a one compartment model involving the uptake rate and elimination rate. The dynamic models are compared with the traditional models, regarding the number of parameters, description of experimental data etc.

Department of Informatics and Mathematical Modeling
Department of Environmental Science and Engineering
**Statistical Treatment of Ecotoxicological Data with Continuous Response using biologically based models**

When characterising complex chemical pollution, e.g., pesticide polluted groundwater or testing the effects of chemical compounds on the environment, ecotoxicological tests are of great value. This is due to their sensitivity and their expression of the overall toxicity. Since environmental pollution is increasing, it is judged that ecotoxicological assays will have increasing impact on the toxicity- and risk assessment of environmental pollution. Evaluating results from ecotoxicological tests inevitably include estimation of dose-response relations. Conclusions about toxicity of the pollution or tested chemicals are summarised in characteristics extracted from the dose-response relationship. A revision of the statistical methods for extracting these measures has been internationally recommended by the scientific community. Generalized Nonlinear regression methods using classical dose-response models, are used to estimate the variance heterogeneous dosis-response relations and estimate endpoints and their confidence limits.

**Statistics in ecotoxicological guidelines**

Project no. 1161. Grundvandscentret. Ph.D. project: Jens Strodl Andersen A revision of the guidelines for ecotoxicological tests has shown severe lack of statistical recommendations. It has been internationally recommended by the scientific community to enhance the use of statistics in the design and data treatment in most ecotoxicological tests. Helle Holst has participated in International workshops which have resulted in reports and articles describing the state of the art and the perspectives for the future. Research regarding design and modelling is ongoing.

**Financing sources**

Source: Unknown
Name of research programme: Ukendt
Amount: 391,200.00 Danish Kroner
**Stereoskopi 1 : ColorCode 1995 - 2003**


**Subtyping and Higher-order Functions**

The goal of this project is to give a proposal for the semantic foundations of algebraic specification languages having subtypes and higher-order functions.

**Surrogate Modelling for Engineering Optimization**

Design optimization of computationally expensive engineering devices and systems through fast, inexpensive surrogate models. Based on corresponding response evaluations a mapping between the expensive system and the inexpensive model is approximated and used in the optimization of the expensive system.

**Acquisition and analysis of complex dynamic intra- and intercellular signaling events. Project no.: 1144, Ph.D-student Ole Skyggebjerg.**

Project no.: 1144 Financed by: ATV/Novo
**Ph.D. Project: Prediction of the Cylinder Condition in Marine Engines Using Neural Networks**

Marine engine monitoring is an active research area with a long history. Successful monitoring is vital for marine traffic safety and significant economic factors can be involved e.g., in the form of transport delay costs and additional use of spare parts. At present, only quite simple electronic methods exist for monitoring the cylinder condition in marine engines. Certain mechanical systems have been constructed, although robust, they do not provide adequate information about the specific fault conditions. Development of new and better methods for signal analysis in fault diagnosing is therefore of great interest. The goal of the project is to develop a detailed and reliable system for monitoring the cylinder condition in marine engines. The cylinder condition will be monitored by use of sensors which either directly or indirectly can measure important parameters of the cylinder condition (temperature, cylinder pressure and sound/vibrations). This demands integration of information from sources with different signal characteristics and signal-to-noise ratios in a comprehensive evaluation of the cylinder condition (signal/sensor fusion). Also, design of performance criteria by use of for instance Bayesian analysis and integration of specific expert knowledge (prior information) will be considered. One specific form of prior information is the so-called wavelet representation for sound/vibration signals. In this case the network input could be...
represented as sound/vibration "images" describing time dependent development of the signal's frequency spectrum. Such representation can be useful for detection of anomalies and non-stationarity. The diagnosing tool will be a neural network and therefore a detailed study of neural network architectures and performance optimization methods will be necessary. Especially methods for analyzing multivariate time series (simultaneous prediction of several parameters) will be in focus.

Department of Informatics and Mathematical Modeling
MAN B&W Diesel A/S
University of Copenhagen
Period: 01/12/1994 → 31/05/1998
Number of participants: 5
Project participant:
Hansen, Lars Kai (Intern)
Fog, Torben L. (Intern)
Peteren, Peter Sunn (Ekstern)
Lautrup, Benny (Ekstern)

Project Manager, organisational:
Sørensen, John Aasted (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 600,000.00 Danish Kroner

Ph.D. project: Hidden Markov Models and Neural Networks
Hidden Markov Models (HMM) are statistical models that are widely used in Automatic Speech Recognition and molecular biology. The parameters (emission and transition probabilities) of a HMM can be estimated from a set of examples by using a Maximum Likelihood (ML) training algorithm. In small vocabulary speech recognition a HMM is trained for each word in the vocabulary, whereas in large vocabulary speech recognition subword HMM's are used (e.g. phoneme HMM's). During recognition the likelihood of each HMM is calculated, and the observed sequence is classified according to the highest likelihood. Since each model is trained using only the sequences assigned to it, it is obvious that training by ML gives non-discriminative models, i.e., the models are not trained to discriminate between words. A discriminative training method called Maximum Mutual Information (MMI) has therefore been developed and successfully applied to a range of applications. There has recently been a widespread interest in combining neural networks and HMM's for speech recognition. If neural networks are used to estimate probabilities in HMM's, it is possible to estimate the weights in the neural network and the parameters in the HMM at the same time by using a gradient descent algorithm. The intention of this project is to analyze and develop algorithms for training combined neural network and HMM models. Investigations have been carried out using the hybrid for recognition of five broad phoneme classes in continuous speech (the TIMIT database). The obtained are promising. Furthermore work has been carried on a more real-world task (the recognition of 39 phonemes in the TIMIT database) also with promising results. Publication.

Department of Informatics and Mathematical Modeling
Department of Chemistry
University of Sheffield
Number of participants: 4
Project participant:
Riis, Søren Kamaric (Intern)
Krogh, Anders Stærmose (Intern)
Renals, Steve (Ekstern)

Project Manager, organisational:
Hansen, Steffen Duus (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 100,000.00 Danish Kroner
Source: Unknown
Name of research programme: Ukendt
Amount: 1,000,000.00 Danish Kroner
**Skjulte Markovmodeller og Neutrale Netværk**

Department of Informatics and Mathematical Modeling  
Number of participants: 3  
Phd Student: Riis, Søren Kamaric (Intern)  
Main Supervisor: Hansen, Steffen Duus (Intern)  
Examiner: Sørensen, Helge Bjarup Dissing (Intern)

**Financing sources**
Source: Internal funding (public)  
Name of research programme: DTU-Su Stipendium, Eksperiment  
Project: PhD

**Selv-organiserede processer og kohærente strukturer i kontinuumsystemer**

Department of Informatics and Mathematical Modeling  
Period: 01/10/1994 → 15/04/1999  
Number of participants: 6  
Phd Student: Schmidt, Michel R. (Intern)  
Supervisor: Bohr, Tomas (Intern)  
Rasmussen, Jens Juul (Intern)  
Main Supervisor: Christiansen, Peter Leth (Intern)  
Examiner: Alstrøm, Preben (Ekstern)  
Brøns, Morten (Intern)

**Financing sources**
Source: Internal funding (public)  
Name of research programme: Forskerakademiets Samfinansier  
Project: PhD

**Sustain**

Sustain is a 3 year network project with 23 leading semiconductor institutes. The topic is submicron technology. The project has included exchange of staff members and workshops every year. The project was ended with 5 reports in 1997.

Department of Information Technology  
Department of Informatics and Mathematical Modeling  
University of Catania  
Universitat Politècnica de Catalunya  
NMRC  
IMEC  
University of Southampton  
University of Parma  
GRESSI  
Instituto de Engenharia de Sistemas e Computadores do Porto  
Consiglio Nazionale delle Ricerche
Max Planck Institute
University of Hannover
National Centre for Scientific Research "Demokritos"
University of Surrey
Delft University of Technology
FhG-IIS-B
University of Twente
Università di Bologna
Vienna University of Technology

University of Salford
Period: 01/10/1994 → 09/02/1998
Number of participants: 24
Project participant:
Campisano, S. (Ekstern)
Castañer, L. (Ekstern)
Crean, G. (Ekstern)
Keersmaecker, R. De (Ekstern)
Meyer, K. De (Ekstern)
Van Overstraeten, R. (Ekstern)
Evans, A. (Ekstern)
Fantini, F. (Ekstern)
Klein, J. P. (Ekstern)
Bomchil, G. (Ekstern)
Freitas, P. (Ekstern)
Gentili, M. (Ekstern)
Habermeier, H. U. (Ekstern)
Hasse, W. (Ekstern)
Hatzakis, M. (Ekstern)
Hemment, P. (Ekstern)
Janssen, G. (Ekstern)
Lorenz, J. (Ekstern)
Mouthaan, T. (Ekstern)
Ricò, B. (Ekstern)
Langer, E. (Ekstern)
van den Berg, J. A. (Ekstern)
Zwicker, G. (Ekstern)

Project Manager, organisational:
Olesen, Ole (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 28,398.00 Danish Kroner

Department of Informatics and Mathematical Modeling
Period: 01/10/1994 → 09/02/1998
Number of participants: 4
Phd Student:
Petersen, Kim T (Intern)
Supervisor:
Sørensen, John Aasted (Intern)
Main Supervisor:
Hansen, Steffen Duus (Intern)
Examiner:
Elberling, Claus (Ekstern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: Erhvervsforskerordningen
Project: PhD

**Ventilation af staldanlæg**
Department of Informatics and Mathematical Modeling
Period: 01/10/1994 → 04/05/2000
Number of participants: 3
Phd Student:
Bennetsen, Jens Christian (Intern)
Main Supervisor:
Christiansen, Peter Leth (Intern)
Examiner:
Barker, Vincent A. (Intern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: Forskerakademiets Samfinansier
Project: PhD

**Analysis and Optimization of the progressive damage in fiber-reinforced materials**
A Ph. D. Study. The cumulative damage and failure of composite materials is modelled by a continuum damage mechanics approach. The sensitivities of the nonlinear and transient system are determined analytically and used in the subsequent optimization problem of finding the optimal fiber-orientation, ply-thicknesses and stacking sequence yielding the strongest lay-up design of the laminate for a given load-situation.

Department of Solid Mechanics
Department of Mathematics
Department of Mechanical Engineering
Period: 01/09/1994 → 31/01/1997
Number of participants: 3
Project participant:
Hammer, Velaja B. (Intern)
Bendsøe, Martin P. (Intern)
Project Manager, organisational:
Pedersen, Pauli (Intern)

**Dynamic vehicle routing.**
Dynamic vehicle routing is dealing with vehicle routing problems in which not all information is available at the start of the planning period. Vehicles are dispatched to satisfy service requests, that evolve in real time. In 1996 a simulater was developed. The simulator generated problem instances which were solved by a static algorithm. The purpose was to analyze how the degree of dynamism influenced the quality of the static solution procedure. Furthermore an algorithm has been developed for dispatching medical doctors serving patients in their homes at night. The algorithm was combined with a very fast shortest route algorithm and a road network database.

Department of Informatics and Mathematical Modeling
COWI A/S
Period: 01/09/1994 → …
Number of participants: 4
Project participant:
Rygaard, Jens Moberg (Intern)
**Financing sources**
- Source: Unknown
- Name of research programme: Ukendt
- Amount: 148,023.00 Danish Kroner

**Elektrisk stimulation af lammede muskler**

- Department of Informatics and Mathematical Modeling
- Period: 01/09/1994 → 03/02/1998
- Number of participants: 2
- PhD Student: Thorsen, Rune A (Intern)
- Main Supervisor: Hansen, Steffen Duus (Intern)

**Financing sources**
- Source: Internal funding (public)
- Name of research programme: Erhvervsforskerordningen
- Project: PhD

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**Parametrization in Laminate Design for Optimal Compliance**

The design problem is analyzed by performing a reformulation to an equivalent problem which is local in character and it is shown how this, together with an enlargement of the design space to allow for out of plane chattering designs, leads to a significant simplification of the problem. Thus the number of variables is reduced to only four for the stiffness problem at hand, even in the general case with coupling stiffnesses and multiple loads. Moreover, in the special case of in-plane loads, the optimal solution for each design element of the plate can be realized as a single rotated ply of material or in special strain situations by two plies. A computational solution procedure for the simplified problem is described and several numerical examples illustrate basic features of the design approach.

- Department of Solid Mechanics
- Department of Mathematics
- Department of Mechanical Engineering
- R. Lipton
- Period: 01/09/1994 → 31/01/1997
- Number of participants: 3
- Project participant: Hammer, Velaja B. (Intern)
- Bendsøe, Martin P. (Intern)
- Project Manager, organisational: Pedersen, Pauli (Intern)

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**Ph.D. Project: Signal Processing with Feedback Networks**

The aim of this project is the analysis of feed-back neural networks, including the learning process, optimization of model structure and statistical validation. A essential property of an adaptive system is adequate training performance. However, it is generally accepted that training feedback networks is a difficult task. The project concerns the analysis of mechanisms complicating training and suggests second order training methods. The use of feedback networks calls for an analysis of stability and robustness. By considering the network as a dynamical system, the project objective is clarify stability issues. Finally, the project is devoted to the study of model structure optimization. In particular, the study focuses on whether existing methods for feed-forward networks can be applied to feedback networks as well. Further, methods for validation of model structures is under development. The feed-back networks are primarily analyzed in connection with time-series modeling/prediction problems.

- Department of Informatics and Mathematical Modeling
Selv-validerende computerbaserede beregningsmetoder for funktionalanalyser (med særlig henblik på anvendelsesmulighederne)

Department of Informatics and Mathematical Modeling
Number of participants: 5
Phd Student:
Stauning, Ole (Intern)
Supervisor:
Knudsen, Carsten (Intern)
Skelboe, Stig (Ekstern)
Main Supervisor:
Madsen, Kaj (Intern)
Examiner:
Skelboe, Stig (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-Su Stipendium, Eksperiment
Project: PhD

Signalbehandling med feedback netværk

Department of Informatics and Mathematical Modeling
Period: 01/09/1994 → 31/10/1997
Number of participants: 5
Phd Student:
Pedersen, Morten With (Intern)
Supervisor:
Larsen, Jan (Intern)
Main Supervisor:
Hansen, Lars Kai (Intern)
Examiner:
Lautrup, Benny (Ekstern)
Sørensen, Helge Bjarup Dissing (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Program Stipendium-SU, Eksp
Project: PhD

Tele-Information and Operations Research

Department of Informatics and Mathematical Modeling
Number of participants: 3
Phd Student:
Borges, Pedro Manuel F. C. (Intern)
Main Supervisor:
Vidal, Rene Victor Valqui (Intern)
Examiner:
Leleur, Steen (Intern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: Friplads_SU
Project: PhD

**Testing Techniques for Self-Timed Circuits**
Department of Informatics and Mathematical Modeling
Number of participants: 2
Phd Student:
Jianwei, Liu (Intern)
Main Supervisor:
Sparsø, Jens (Intern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: Friplads_SU
Project: PhD

**Error Bounds for Differential Equations**
Methods for the solution of integral equations and ordinary differential equations, with automatic determination of error bounds which are guaranteed to enclose the exact solution. Interval analysis is used. The methods are applied to prove the existence of periodic solutions to certain differential equations occurring in dynamic systems theory.

Department of Informatics and Mathematical Modeling
Period: 01/08/1994 → 31/12/1997
Number of participants: 2
Project participant:
Stauning, Ole (Intern)
Project Manager, organisational:
Madsen, Kaj (Intern)

**Optimering af ligningsløsere**
Department of Informatics and Mathematical Modeling
Period: 01/08/1994 → 21/07/2000
Number of participants: 6
Phd Student:
Jeppesen, Michael (Intern)
Supervisor:
Michelsen, Jess (Intern)
Sørensen, Jens Nørkær (Intern)
Main Supervisor:
Thomsen, Per Grove (Intern)
Examiner:
Barker, Vincent A. (Intern)
Michelsen, Jess (Intern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: Forskningsrådsstip.-SU, Eksp
Project: PhD
Proof visualization
A new branch of mathematical visualization was proposed by Niels Bonde Jensen, viz.: the visualization (as opposed to mere illustration) of mathematical proofs. This subject can be regarded as a branch of mathematics or, independently, as a branch of scientific graphical communication. Both points of view are pursued.

Department of Informatics and Mathematical Modeling
Period: 01/08/1994 → …
Number of participants: 2
Project participant:
Jensen, Niels Bonde (Ekstern)
Project Manager, organisational:
Hansen, Per Skafte (Intern)

Integrations- og konsistensproblemer i produktmodeller for byggeri

Department of Informatics and Mathematical Modeling
Period: 01/07/1994 → 21/01/1998
Number of participants: 2
Phd Student:
Jacobsen, Kim (Intern)
Main Supervisor:
Galle, Per (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådssstip.-SU, Eksp
Project: PhD

Boundary Element Analysis and Computation of Shell Equations
The aim of the project is to provide precise boundary element formulations for plate and shell equations, using pseudodifferential methods.

Department of Mathematics
Texas A&M University
Period: 21/06/1994 → 31/12/1998
Number of participants: 2
Project participant:
Chen, Goong (Ekstern)
Project Manager, organisational:
Pedersen, Michael (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 50,000.00 Danish Kroner
Project

Prognosemodeller for gasforbrug
Der udvikles statistiske modeller til prognoser af gasforbrug. Modellerne implementeres i samarbejde med LICconsult i en større tysk by.

Department of Informatics and Mathematical Modeling
LICconsult
Period: 17/06/1994 → 30/06/1996
Number of participants: 2
Project participant:
Nielsen, Torben Skov (Intern)
Project Manager, organisational:
Madsen, Henrik (Intern)
Identification af modeller for kedel og varmeanlæg


Department of Informatics and Mathematical Modeling

Grundfos A/S
Period: 01/06/1994 → 31/05/1997
Number of participants: 5
Project participant:
Hansen, Lars Henrik (Intern)
Holst, Jan (Ekstern)
Bidstrup, Niels (Ekstern)
Vadstrup, Pierre (Ekstern)

Project Manager, organisational:
Madsen, Henrik (Intern)

Financing sources
Source: Unknown
Amount: 200,000.00 Danish Kroner

Identification af modeller for kedel og varmeanlæg

Department of Informatics and Mathematical Modeling
Period: 01/06/1994 → 11/02/1998
Number of participants: 4
Phd Student:
Hansen, Lars Henrik (Intern)
Main Supervisor:
Madsen, Henrik (Intern)
Examiner:
Hansen, Poul Erik (Ekstern)
Poulsen, Niels Kjølstad (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Erhvervsforskerordningen
Amount: 30,645.00 Danish Kroner

Design of observer based controllers

This project deal with design of observers in connection with feedback control. The concept of loop transfer recovery (LTR) has been investigated for the design of observers as well as design of fixed order LTR controllers. In the usual LTR setting, design rules are developed based on sufficient conditions for recovery only. A consequence of this is that the design rules might not necessary point out the 'best' controller from an LTR point of view. Another drawback lies in the assumed controller architecture in previous approaches. Thus, it has not been investigaged if different choices of controller types would yield better general performance, or, conversely, which special performance properties are associated with different classes of compensators. The LTR concept has, in this project, been applied on continuous-time, discrete-time and sampled date systems. Further, there has been focus on both design methods as well as on new observer/controller architectures for increasing the controller performance. In the area of design methods, new methods has been derived out from standard induced norm based methods. Two new architectures has been derived for increasing the specific performance conditions of the controller. The first architecture is the socalled PI observer which make it
possible to increase the performance at low frequencies. This is quite relevant in connection with non minimum phase systems, where it is not possible to obtain good performance at low frequencies by using a standard observer architecture. The other new architecture is related with fixed order LTR controller design. A linear matrix inequality (LMI) design approach for fixed order controllers has been derived.

Department of Automation

Department of Mathematics

Period: 01/05/1994 → …
Number of participants: 3
Project participant:
Rank, Mike Lind (Intern)
Stoustrup, Jakob (Intern)
Project Manager, organisational:
Niemann, Hans Henrik (Intern)

Tidsrækkeanalyse og Danamisk Modellering af Regnvands påvirkede Receiver

Department of Informatics and Mathematical Modeling

Period: 01/04/1994 → 29/05/1997
Number of participants: 2
PhD Student:
Jacobsen, Judith L. (Intern)
Main Supervisor:
Madsen, Henrik (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Erhvervsforskerordningen
Project: PhD

Time series analysis and dynamic modelling of processes in rivers affected by precipitation runoff

Physical, chemical and biological processes involved in the oxygen dynamics in receiving waters are assessed through identification and estimation of stochastic dynamical models. The dynamics are expressed as a function of solar radiation, precipitation, surface runoff and runoff from urban sewer systems. The goal is a formulation in continuous time, which facilitates a direct physical interpretation and involves known physical laws and parameters in the model. The models will be used to assess the water quality of the receiving waters, with respect to the planning and management of water quality as well as the sensitivity to external influences. This will in turn increase the understanding of the complicated processes involved. The methods used, are the so-called "grey/box" techniques, which combine and exploit the strongest parts of the hitherto most used methodology. Here, known physical differential equations, as well as the data, are used to estimate parameters and possibly unknown processes. This means that non-linear processes can easily be included in the model, as opposed to traditional black-box models. Furthermore, stochastic effects, that any natural system will contain, can be accommodated.

Department of Informatics and Mathematical Modeling

PH-Consult Aps.
Period: 01/04/1994 → 31/05/1997
Number of participants: 4
Project participant:
Jacobsen, Judith L. (Intern)
Harremoes, Poul (Ekstern)
Linde Jensen, Jens Jørgen (Ekstern)
Project Manager, organisational:
Madsen, Henrik (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 13,500.00 Danish Kroner
Project
Usikkerhedsbeskrivelse i kvantitative risikoanalyser.
Det er projektets direkte formål at forøge anvendeligheden af kvantitative risikoanalyser gennem udvikling af metoder, som gør det muligt at leve op til kvalitetskravene i Dansk Standards DS-Information om risikoanalyse (DS/INF85) for så vidt angår kvantitative usikkerhedsvurderinger. Dvs. udvikling af metoder og principper for beskrivelse og analyse af usikkerheder med en sådan troværdighed, at kvantificerede risici meningsfyldt kan sammenlignes indbyrdes eller relateres til kvantitative acceptkriterier.

Department of Informatics and Mathematical Modeling
Period: 01/04/1994 → 01/06/1996
Number of participants: 1
Project Manager, organisational:
Hansen, Niels Herman (Intern)

Adaptive Neural Signal Processing Systems
Starting from nonlinear adaptive systems based on neural networks, the objective is to study methods for: * model evaluation and interpretation * adaptive learning in non-stationary environments * optimization of model structures * design of experimental conditions including database design. Model evaluation (including generalization ability) and interpretation are fundamental issues when designing signal processing systems for practical applications, and several problems regarding definition and reliable estimation are still to be solved. The fact that most practical problems involves adaptation to changing environmental conditions calls for investigation of methods for model design, including optimization of model structure. In particular, recurrent neural networks and heterogeneous network ensembles will be studied. Finally, the project covers methods for experimental design, especially active learning and combined supervised/unsupervised learning schemes. The theoretical research is carried out in close synergy with application projects covering: * Analysis and interpretation of brain scan data * Medical decision support systems, * Humanitarian mine detection * Monitoring and inspection systems.

Department of Informatics and Mathematical Modeling
Period: 01/03/1994 → …
Number of participants: 2
Project participant:
Hansen, Lars Kai (Intern)
Project Manager, organisational:
Larsen, Jan (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 500,000.00 Danish Kroner

Løsning af Komplekse Kombinatoriske Problemer
Department of Informatics and Mathematical Modeling
Period: 01/03/1994 → 03/08/1998
Number of participants: 2
Phd Student:
Hansen, Michael Pilegaard (Intern)
Main Supervisor:
Vidal, Rene Victor Valqui (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-Su Stipendium, Eksperiment
Project: PhD

Parallelle Algoritmer til løsning af partielle differentialligninger
Department of Informatics and Mathematical Modeling
Period: 01/03/1994 → 17/08/1998
Number of participants: 4
Phd Student:
Nielsen, Ole Møller (Intern)
Ph.D. Project: Wavelets in Scientific Computing
This project is concerned with the use of wavelets to solve certain partial differential equations, the nonlinear Schrodinger equation in particular, and the parallel computation of wavelet transforms. The emphasis is on the wavelets with compact support discovered by I. Daubechies.

Department of Informatics and Mathematical Modeling
Period: 01/03/1994 → 28/02/1998
Number of participants: 4
Project participant:
Nielsen, Ole Møller (Intern)
Hansen, Per Christian (Intern)
Sørensen, Mads Peter (Intern)
Barker, Vincent A. (Intern)

Wavelets in Scientific Computing
Wavelet analysis is a relatively new mathematical concept that has already been widely accepted in signal processing, e.g., for purposes such as image compression. The crucial feature of wavelets is the ability to represent different parts of a function on different scales which makes for very sparse representations of functions that contain local oscillations or even singularities. We study the potential for using these desirable properties of wavelets for solving partial differential equations.

Department of Informatics and Mathematical Modeling
Period: 01/03/1994 → 28/02/1998
Number of participants: 1
Project Manager, organisational:
Nielsen, Ole Møller (Intern)

Connection between control design and system identification
Department of Informatics and Mathematical Modeling
Period: 01/02/1994 → 24/07/1997
Number of participants: 3
Phd Student:
Lauritsen, Morten Bach (Intern)
Main Supervisor:
Poulsen, Niels Kjølstad (Intern)
Examiner:
Egardt, Bo (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU Su Stipendium, Eksperiment
Project: PhD

Geometric Heat Kernel Comparison Theory
Using comparison theory for the Laplacian of geometrically restricted distance functions we obtain relations between essential features of diffusion processes, isoperimetric inequalities and curvature.
Vegetation and soil

Vegetation and soil parameters are important for studies using global circulation models. The parameters are essential in estimating and modelling e.g. surface energy balance, evapotranspiration, desertification, deforestation, and carbon dioxide circulation, and on a local scale on yield prediction and agricultural subsidiary enforcement. Vegetation and soil parameters such as soil moisture, vegetation type, structural characteristics for the vegetation (height, foliage, density), and vegetation biomass may be estimated from microwave remote sensing. The research aims at: 1) improving the techniques to determine vegetation type from SAR images, especially agricultural crops, but also with a view to natural
vegetation, such as trees and heath; and 2) studying and evaluating algorithms for retrieval of vegetation and soil parameters, such as soil moisture, and vegetation height and biomass. The application of SAR to monitor agricultural crops, biomass and soil moisture is being studied in collaboration with Research Center Foulum (RCF). The farmland at RCF has been mapped each year from 1994 to 1998 from March to July with both L- and C-band polarimetric SAR. During the growing season and particularly at the time of data acquisition, a series of in-situ measurements was performed of soil and vegetation parameters. This information is used to interpret and model the backscatter characteristics of the soil and vegetation and forms the basis for studying methods for parameters retrieval. The main results of this project are new results in the understanding of scattering mechanisms for backscattering from agricultural crops, new methods for the classification of crops, and thorough evaluation of the classification potential of polarimetric SAR. Results have been or will be published at conferences and in papers.

Department of Electromagnetic Systems
Department of Informatics and Mathematical Modeling
Department of Electrical Engineering
Danish Institute of Agricultural Sciences
University of Copenhagen
National Environmental Research Institute
Period: 01/02/1994 → 31/12/2000
Number of participants: 7
Project participant:
Svendsen, Morten Thougaard (Intern)
McCloy, Keith (Ekstern)
Thomsen, Anton (Ekstern)
Hansen, Birger U. (Ekstern)
Nielsen, Allan Aasbjerg (Intern)
Groom, Geoff (Ekstern)
Project Manager, organisational:
Skriver, Henning (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 0.00 Danish Kroner
Source: Unknown
Name of research programme: Ukendt
Amount: 1,077,000.00 Danish Kroner
Project

Compound slot waveguide antennas
Large, slotted waveguide arrays, used eg. in satellite borne remote sensing payloads have a very narrow band width, since the slots must be detuned to compensate for mutual coupling. It is investigated whether the band width can be increased through the use of compound radiating slots, since they can compensate for mutual coupling through change of off-set and inclination, while remaining resonant

Department of Informatics and Mathematical Modeling
Period: 01/01/1994 → …
Number of participants: 1
Project Manager, organisational:
Albertsen, Niels Christian (Intern)
Project

European Centre for mathematics and technology of urban water pollution.

Department of Environmental Engineering
Department of Environmental Science and Engineering
Department of Informatics and Mathematical Modeling
Period: 01/01/1994 → 31/12/1998
Number of participants: 18
Project participant:
Warnaars, Eric (Intern)
Spliid, Henrik (Intern)
Hvidtved-Jacobsen, Thorkild (Ekstern)
Aalderink, Hans (Ekstern)
Matos, Maria R. (Ekstern)
Andreadakis, Andreas (Ekstern)
Butler, David (Ekstern)
Dupont, Rene (Ekstern)
Dørge, Jesper (Ekstern)
Heras, Jaime G. (Ekstern)
Gujer, Willi (Ekstern)
Nelen, Fons (Ekstern)
Pinto, Appio di (Ekstern)
Revitt, Mike (Ekstern)
Svensson, Gilbert (Ekstern)
Tyson, John (Ekstern)
Verworn, Hans R. (Ekstern)

Project Manager, organisational:
Harremoës, Poul (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 3,045,000.00 Danish Kroner
Project

Forsøgsplanlægning for identifikation af delvis kendte systemer (grey-box modeller)
Forsøgsplanlægning er et fundamentalt område inden for system-identifikation. Optimalt planlagte eksperimenter fører til en mere effektiv model som f.eks. kan bruges til estimation af ukendte parametre, regulering, fejl-detektering, mv. Apriori viden (delvis viden) kan i denne sammenhæng formuleres og benyttes i design.

Department of Informatics and Mathematical Modeling
Lund Institute of Technology
Period: 01/01/1994 → 31/12/1996
Number of participants: 3
Project participant:
Sadegh, Payman (Intern)
Holst, Jan (Ekstern)

Project Manager, organisational:
Madsen, Henrik (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 300,000.00 Danish Kroner
Project

Human Brain Project
Neuroscience is expanding nationally and internationally. The 90's were proclaimed "Decade of the Brain" by the US Congress, and a large funding program the so-called "Human Brain Project" was established. Nationally the Danish Research Councils created a substantial funding program for Interdisciplinary Neuroscience. New technology is key to the growth of neuroscience and engineering and informatics competences are of vital importance for large neuroscience projects. The DTU Human Brain Project group collaborates with an international consortium of researchers from leading neuroscience labs in the USA and Japan on new data analytic strategies for functional neuroimaging. In the 1996 the group was funded by the US Human Brain Project and by the Danish Research Councils. Functional neuroimaging by Positron Emission Tomography (PET) and functional Magnetic Resonance Imaging (fMRI) is opening a new window to the working human brain. These brain scan techniques provide highly complex data sets. The scans are indirect measures of brain activity while subjects perform well defined mental tasks. The work of the DTU group concerns basic signal processing, pattern recognition and visualization. A fast volume "warp" algorithm was developed for co-registration of PET brain scans using anatomical MRI applied to co-registration of PET group studies at Rigshospitalet, University of
Copenhagen. Markov Field methods were developed for edge preserving smoothing of PET scans. Artificial neural network models were designed, evaluated, and visualized for detection of brain activation in PET scans under saccadic eye movements. Noise levels in PET scans were analyzed. A number of data analytic strategies for fMRI were compared on data sets from Massachusetts General Hospital. Artificial neural networks were used to estimate Glucose Metabolism from dynamic PET scans.

Department of Informatics and Mathematical Modeling
University of Copenhagen

Minneapolis VA Medical Center
University of Minnesota

Research Institute of Brain & Blood Vessels
University of Chicago
Massachusetts General Hospital
Harvard Medical School

Period: 01/01/1994 → …
Number of participants: 21
Project participant:

Ohlsson, Børje Ola Mattias (Intern)
Toft, Peter Aundal (Intern)
Nielsen, Finn Årup (Intern)
Mørch, Niels J.S. (Intern)
Kjems, Ulrik (Intern)
Philipsen, Peter Alshede (Intern)
Rasmussen, Carl Edward (Intern)
Larsen, Jan (Intern)
Paulson, Olaf B. (Ekstern)
Svarer, Claus (Ekstern)
Law, Ian (Ekstern)
Gade, Anders (Ekstern)
Lautrup, Benny (Ekstern)
Rottenberg, David (Ekstern)
Strother, Stephen (Ekstern)
Kim, Seong-Gi (Ekstern)
Kanno, Iwao (Ekstern)
Chen, Chin-Tu (Ekstern)
Savoy, Robert (Ekstern)
Lange, Nicholas (Ekstern)

Project Manager, organisational:
Hansen, Lars Kai (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 845,377.00 Danish Kroner

Microbial studies of an anaerobic leachate plume

Microbial studies were performed in 37 locations in the leachate plume at Grindsted Landfill in terms of MPN-counting of methanogens, sulfate-reducers, iron-reducers, manganese-reducers and denitrifiers, ATP levels, PLFA levels and composition and redox activities in unamended bioassays. Volatile fatty acids, H2 concentrations and (no) protozoa were measured as well. Several redox processes were identified in the same samples but usually one process dominated when compared on a carbon conversion basis. The leachate significantly affected the microbial populations, but the distribution of the actual redox activities were not limited by the microbial populations but the availability of electron donors and acceptors.

Department of Environmental Science and Engineering
Department of Informatics and Mathematical Modeling

Department of Environmental Engineering

Waterways Experimental Station, Vikcsburg (PLFA)

University of Copenhagen

Period: 01/01/1994 → 30/03/1997

Number of participants: 8

Project participant:

Ludvigsen, Liselotte (Intern)
Albrechtsen, Hans-Jørgen (Intern)
Refstrup, Mona (Intern)
Hansen, Karin (Intern)
Ringelberg, D.B. (Ekstern)
Holst, Helle (Ekstern)
Ekelund, F. (Ekstern)

Project Manager, organisational:

Christensen, Thomas Højlund (Intern)

Financial sources

Source: Unknown
Name of research programme: Ukendt
Amount: 1,800,000.00 Danish Kroner

Robust og optimal regulering af uendelig-dimensionale systemer

Department of Mathematics

Period: 01/01/1994 → ...

Number of participants: 4

Phd Student:

Larsen, Mikael (Intern)

Main Supervisor:

Bendsøe, Martin P. (Intern)

Examiner:

Jannerup, Ole Erik (Intern)
Perram-John, William (Ekstern)

Financial sources

Source: Internal funding (public)
Name of research programme: Forskningsrådsstip.-SU, Eksp
Project: PhD

Statistisk finansieringsteori

Liberaliseringen af de internationale finansmarkede har gjort det nødvendigt for banker og investeringsselskaber mm. at anvende avancerede matematiske og statistiske metoder til risikostyring og -elimination (hedging). Der benyttes ikke-lineære filtreringsmetoder til parameter- og tilstandsestimation i diskret observerede stokastiske differentialligninger. Der anvendes ikke-parametriske metoder til idenfifikation af stokastiske differentialligninger og heteroskedastiske modeller i diskret tid. Metoderne anvendes til modellering af multivariate rentestrukturmodeller og stokastiske volatilitetsmodeller.

Department of Informatics and Mathematical Modeling

Unibank

Basispoint

Period: 01/01/1994 → ...

Number of participants: 3

Project participant:

Nielsen, Jan Nygaard (Intern)
Baadsgaard, Mikkel (Intern)

Project Manager, organisational:

Madsen, Henrik (Intern)
**Project**

**Tracking Problems for Distributed Parameter System**
This project is primarily about control of a beer pasteurization process, treated as a robust tracking problem for a distributed parameter system. The treatment includes modelling of the system, aspects of controller design and computational issues. The framework is a combination of recently developed advanced techniques for robust control of finite and infinite dimensional systems. The tunnel pasteurizer is modelled as a Cauchy problem and standard semigroup theory is applied in order to write the solution in closed form (a semigroup solution). After calculating the respective transfer functions, the appearing linear systems are formulated within the framework of the Pritchard-Solomon class, a class of systems that allow more general input and output operators than standard distributed systems. This ensures that the entire system is well-posed. Due to this, one can refer to rather general robustness results, which obviously is convenient, although some generalization is required. Also, a novel approach to robust tracking problems has been introduced, which directly distinguishes between control actions which must be taken due to the presence of uncertainties, and control actions which must be taken due to tracking criteria, which are of an altogether different nature. The approach addresses the class of almost periodic functions and the main results provide necessary and sufficient conditions for the existence of (possibly infinite-dimensional) controllers which solve the robust tracking problems. Moreover, explicit controller formulae can be given in semigroup formulations.

Department of Mathematics  
**Period:** 01/01/1994 → 01/01/1997  
**Number of participants:** 3  
**Project participant:**  
Bendsøe, Martin P. (Intern)  
Larsen, Mikael (Intern)  
Project Manager, organisational:  
Pedersen, Michael (Intern)

**Financing sources**  
Source: Unknown  
Name of research programme: Ukendt  
Amount: 1,000,000.00 Danish Kroner

**Visualization of Cut-loci**
The purpose of this project is to visualize the cut-locus for a point on a two-dimensional surface.

Department of Mathematics  
**Period:** 01/01/1994 → …  
**Number of participants:** 3  
**Project participant:**  
Markvorsen, Steen (Intern)  
Sinclair, Robert (Intern)  
Project Manager, organisational:  
Gravesen, Jens (Intern)

**Distributed Parameter Systems: Analysis, Synthesis and Control**
EU-HCM-programme concerning various aspects of the control of systems governed by pde's.

Department of Mathematics  
**Period:** 29/11/1993 → 31/05/1998  
**Number of participants:** 4  
**Project participant:**  
Bendsøe, Martin P. (Intern)  
Cromme, Marc (Intern)  
Larsen, Mikael (Intern)  
Project Manager, organisational:  
Pedersen, Michael (Intern)

**Financing sources**  
Source: Unknown  
Name of research programme: Ukendt
**CADUS, Center for Arteriosclerosis Detection with Ultrasound**

Atherosclerosis of the carotid arteries is a common cause of stroke, the leading cause of disabling disease and the third most common cause of death. Atherosclerosis arises from the formation of material deposits (plaque) on the inside of the artery wall. The plaque slowly builds up in the artery wall over a number of years. The pathogenetic mechanism is believed to be embolic in the large majority of cases, with either fragments of the atherosclerotic lesion or thrombotic elements of the surface of the plaque braking off and moving with the blood into the brain. Once a major brain artery is occluded by an embolus and brain damage has resulted, no specific therapy exists today. Therefore, preventive measures are of great importance and today patients with symptomatic severe lesions are offered surgical therapy. Until now, treatment has mainly been given based on the degree of narrowing of the carotid arteries. Recent research has indicated that other factors may be important as well. Especially, the appearance of the carotid atherosclerotic lesions on ultrasound B-mode images has been shown to be related to the risk of development of neurological symptoms. The aim of CADUS is to develop new improved methods for detection and classification of atherosclerotic plaque. A number of projects are conducted within CADUS (http://www.it.dtu.dk/~wilhjelm/cadus.html): Influence of Formalin Fixation Prior to in vitro Ultrasound Examination of Porcine Arteries. Digital Image Analysis of Ultrasound B-Mode Images of Carotid Plaque. Estimation of Carotid Plaque Contents With Multi-Angle 3D Compound Imaging. Experimental Ultrasound System for investigation of multi-angle compound imaging. The Diffraction Response Interpolation Method. Measurement of Echo Signals from Rough Surfaces of Infinite Extent.

Department of Information Technology

University of Copenhagen

Department of Informatics and Mathematical Modeling

BK Medical Aps

Worcester Polytechnic Institute

University of Copenhagen

Period: 01/11/1993 → …

Number of participants: 7

Project participant:

Jespersen, Søren Kragh (Intern)

Martinsen, Kjeld (Intern)

Pedersen, Peder C. (Ekstern)

Grønholdt, Marie-Louise M. (Ekstern)

Vogt, Katja (Ekstern)

Project Manager, organisational:

Wilhjelm, Jens E. (Intern)

Sillesen, Henrik (Ekstern)

**Financing sources**

Source: Unknown

Name of research programme: Ukendt

Amount: 250,000.00 Danish Kroner

Source: Unknown

Name of research programme: Ukendt

Amount: 100,000.00 Danish Kroner

**Elektrisk stimulation af delvist lammede muskler**

Department of Informatics and Mathematical Modeling


Number of participants: 4

Phd Student:

Sennels, Søren (Intern)

Supervisor:

Andersen, Ole Trier (Intern)

Main Supervisor:

Hansen, Steffen Duus (Intern)

Examiner:

25_NN_Studenter/Øvrige medarb. (Ekstern)
Generation of Ultra Short Optical Pulses

A mathematical model has been derived, describing Colliding-Pulse Mode-Locked (CPM) quantum well lasers. Simulations have been conducted on an InGaAsP laser. Spectral hole burning influences strongly the optical pulse formation. The final pulse width results from a balance between spreading in the gain sections and compression in the absorber section of the CPM laser. Both effects are influenced by ultra fast gain dynamics. An alternative approach to generation of ultra short optical pulses is the use of a mode-locked fibre ring laser. Both passive and active mode-locking have been studied by numerical simulations of the Nonlinear Schrodinger equation. Active mode-locking is achieved by the use of a Mach-Zehnder amplitude modulator.

Department of Informatics and Mathematical Modeling

Tele Danmark Research

University of Rouen

Chalmers University of Technology

Department of Mathematics

Ikke-lineær dynamik af CPM kvantebrøndslasere og andre optiske komponenter

Department of Mathematics

Specifikation og verifikation af modulære parallellprogrammer

Department of Informatics and Mathematical Modeling
Løvengreen, Hans Henrik (Intern)
Examiner: 
Hansen, Bo Stig (Intern)
Liu, Zhiming (Ekstern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: DTU Stipendium, Eksperiment
Project: PhD

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**Visualisering af geometriske modeller-rendering**

Department of Informatics and Mathematical Modeling
Period: 01/09/1993 → 09/09/1997
Number of participants: 5
Phd Student: 
Jensen, Henrik Wann (Intern)
Main Supervisor: 
Christensen, Niels Jørgen (Intern)
Examiner: 
Henriksen, Knud (Ekstern)
Jansen, Frederik W. (Ekstern)
Takala, Tapio (Ekstern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: DTU Stipendium, Eksperiment
Project: PhD

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**Identifikation af Grey-Modeller**

Department of Informatics and Mathematical Modeling
Period: 01/08/1993 → 21/03/1997
Number of participants: 3
Phd Student: 
Sadegh, Payman (Intern)
Main Supervisor: 
Madsen, Henrik (Intern)
Examiner: 
Ljung, Lennert (Ekstern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: DTU Stipendium, Eksperiment
Project: PhD

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**Optimering af fjernvarmestystemer**


Department of Informatics and Mathematical Modeling
Rambøll Danmark A/S

**HTF**
Period: 01/07/1993 → 30/06/1996
Number of participants: 3
**Project participant:**
Nielsen, Torben Skov (Intern)
Nielsen, Henrik Aalborg (Intern)

**Project Manager, organisational:**
Madsen, Henrik (Intern)

## Financing sources
- **Source:** Unknown
- **Name of research programme:** Ukenndt
- **Amount:** 200,000.00 Danish Kroner

**Project**
Parallelle numeriske algoritmer til løsning af systemer af sædvanlige differentialligninger

*Department of Informatics and Mathematical Modeling*

- **Period:** 01/07/1993 → 04/12/1996
- **Number of participants:** 5
- **Phd Student:** Bendtsen, Claus (Intern)
- **Supervisor:** Skelboe, Stig (Ekstern)
- **Main Supervisor:** Thomsen, Per Grove (Intern)
- **Examiner:** Houbak, Niels (Intern)
- **Söderlind, Gustaf (Ekstern)**

## Financing sources
- **Source:** Internal funding (public)
- **Name of research programme:** Forskerakademiets Samfinansier

**Project**
Quasi-conformal Surgery

The technique of quasi-conformal surgery in holomorphic dynamics was initiated by Sullivan, Douady, Hubbard and Shishikura in the early eighties. The method is to create new dynamical systems out of some given ones, by changing not only the dynamical plane (through cutting and sewing) and the map defining the dynamical system, but also the complex structure of the new dynamical plane. The theory of quasi-conformal mappings is the basic tool. Surgery techniques appear to be particularly successful, when two families of maps can be related in such a way that dynamical similarities are transferred to similarities between structures in the corresponding parameter spaces. Homeomorphisms between p/q-limbs of the Mandelbrot set, with fixed denominator q, have been obtained. Generalizations are currently being investigated.

*Department of Mathematics*

- **Universidad Autonoma de Barcelona**
- **Period:** 01/07/1993 → ...
- **Number of participants:** 2

**Project participant:**
Fagella, Nuria (Ekstern)

**Project Manager, organisational:**
Branner, Bodil (Intern)

**Project**
Udvikling, afprøvning og implementering af GPC-regulatorer i fjernvarmesystemer

Formålet med projektet er at udvikle praktisk anvendelige GPC (General Predictive Control) reguleringsalgoritmer til driftsoptimering af kraftvarme- og fjernvarmesystemer. Arbejdet er en videreførelse af et tidligere EFP projekt - "Optimeret drift af fjernvarmesystemer". GPC-regulatoren er baseret på tidligere fundne modeller for tidsforsinkelse og temperatur forløb i distributionssystemet samt på prognosemodeller for forventet varmeforbrug. Den styrede variabel er fremløbstemperaturen der optimeres mht. brændselsforbrug, forsyningssikkerhed, siltage på distributionssystemet mm..

De udviklede algoritmer afprøves online hos Høje Taastrup Fjernvarme. Arbejdet er delvist finansieret af Energiministeriets Forskningsprogram gennem EFP93 - "Regulering af fremløbstemperatur".

*Department of Informatics and Mathematical Modeling*
Modelling and control of flexible robot

The project deals with the modelling and control of flexible robot arms with special reference to be able to increase the payload/own weight ratio of manipulators. It is of vital importance to improve this ratio in the endeavour to improve the skills and the efficiency of future robots. The mechatronic approach in robotics is tested in a design case study of a pick and place 2 DOF SCARA robot as the restrictive constraint in the mechanical design that the links have to be rigid is relaxed. To maintain a good link tip position accuracy the relaxing of the constraint necessitate improved knowledge in the remaining involved disciplines in the integrated design in order to avoid that vibrations induced in the robot link have destructive effect on the tip positioning. A brief introduction to the modelling of distributed parameter systems is subsequently given before the theory is applied in modelling a flexible robot arm. A number of link models are derived. The first two models presented describes in-plane transverse vibrations in a free rotating flexible robot link. (modal representation and finite element modelling). In some applications of manipulators they interact with the environment which affect the dynamics of a flexible link. This fact resulted in the derivation of three models of a flexible link used in tip force control. The extended knowledge of the behaviour of a working flexible robot link gained is used on the case study manipulator in a passive non-ad-hoc rigid robot design application and in an active flexible robot design application. Out-of-plane link vibrations are treated as well in the thesis as they in most applications will be excitated too. In order to be able to damp the out-of-plane transverse vibrations a lightweight distributed piezoelectric actuator is introduced which acts as an active artificial stiffening in the particular direction.
Kleinske grupper og Holomorfe dynamiske systemer
Department of Mathematics  
Period: 01/02/1993 → 24/07/1997  
Number of participants: 2  
Phd Student:  
Willumsen, Pia B.N. (Intern)  
Main Supervisor:  
Branner, Bodil (Intern)  

Financing sources  
Source: Internal funding (public)  
Name of research programme: Forskningsrådsstip.-SU, Eksp  
Project: PhD

Multiplikatorfrie, digitale filterstrukturer
Department of Informatics and Mathematical Modeling  
Period: 01/02/1993 → 03/09/1996  
Number of participants: 4  
Phd Student:  
Shajaan, Mohammad (Intern)  
Supervisor:  
Møller, Peter Koefoed (Ekstern)  
Main Supervisor:  
Sørensen, John Aasted (Intern)  
Examiner:  
Sørensen, Helge Bjarup Dissing (Intern)  

Financing sources  
Source: Internal funding (public)  
Name of research programme: DTU-Su Stipendium, Eksperiment  
Project: PhD

NEAR  

Department of Information Technology  
Department of Informatics and Mathematical Modeling  
Katholieke Universiteit  
Period: 01/02/1993 → 01/09/1997  
Number of participants: 2  
Project participant:  
Sansen, Willy (Ekstern)  
Project Manager, organisational:  
Olesen, Ole (Intern)  
Project

Stokastisk analyse
Department of Mathematics  
Period: 01/02/1993 → 29/05/1996  
Number of participants: 3  
Phd Student:  
Knudsen, Thomas Skov (Intern)  
Supervisor:  
Jørsboe, Ole Groth (Intern)  
Main Supervisor:  
Hansen, Vagn Lundsgaard (Intern)
Transformationsorienterede metoder i VLSI-design

Department of Informatics and Mathematical Modeling
Period: 01/02/1993 → 09/09/1997
Number of participants: 2
PhD Student:
Rasmussen, Ole Steen (Intern)
Main Supervisor:
Sharp, Robin (Intern)

Adaptively controlled surfaces
Future communication satellite antennas will need to be able to change their radiation characteristics in space to adapt to changes in the volume of traffic carried. For reflector antennas, this can be achieved with a reflector surface which can change shape under control of a limited number of remotely controlled actuators. A mathematical description of such a surface in the form of a 4th order partial differential equation with appropriate boundary values is developed. The project is carried out as part of the work prepared by the scientific staff at IMM. No specified budget. Publication: Niels C. Albertsen, Soeren Christiansen, Knud Pontoppidan and Stig Busk Soerensen: Mathematical Treatment of an Adjustable Surface Formed by a Fabric of Interwoven Flexible Wires. Mathematical Engineering in Industry 6 (1997)115-132. IMM-REP-1996-2.

IONES
Computational and Experimental Fluid Mechanics. Cooperation with dept. of Fluid Mechanics Frame programme from STVF Grant nr. 5.26.16.31

Numerical problems in topology optimization
This project investigates different problems appearing in numerical applications of topology optimization methods. Examples are appearance of checkerboard patterns in "optimal" designs, mesh-dependencies and convergence to local minima. Another problem is to implement stress constraints in topology optimization in a numerically efficient way. (Financed by STVF).

Department of Solid Mechanics
Department of Mathematics
Robustness of Stochastic Differential Equations
The robustness in the mean square and in the pathwise sense of stochastic differential equations in $\mathbb{R}^d$, driven by $d$-dimensional Wiener process was shown. Implications for robustness of the nonlinear filtering problem were investigated.

Department of Mathematics

Space mapping for engineering optimization
The space mapping technique is intended for optimization of engineering models which involve very expensive function evaluations. It is assumed that two different models of the same physical system are available: Besides the expensive model of primary interest (denoted the fine model), access to a cheaper (coarse) model is assumed which may be less accurate. The main idea of the space mapping technique is to use the coarse model to gain information about the fine model, and to apply this in the search for an optimal solution of the latter. Thus the technique iteratively establishes a mapping between the parameters of the two models which relate similar model responses. Having this mapping, most of the model evaluations can be directed to the fast coarse model. In many cases this technique quickly provides an approximate optimal solution to the fine model that is sufficiently accurate for engineering purposes. Thus the space mapping technique may be considered a preprocessing technique that perhaps must be succeeded by use of classical optimization techniques.

Department of Informatics and Mathematical Modeling
Department of Civil Engineering
McMaster University

Subdivision and geometric properties of Bézier Curves and Surfaces
Subdivision is a wellknown algorithm which often is used to evaluate Bézier curves and surfaces. In this project we investigate the possibility to use subdivision to determine important geometric properties of the curve or surface, such as length, area, and curvature

Department of Mathematics

Biomekanisk Skuldermodel

Department of Mathematics
Period: 01/12/1992 → 07/10/1996
Number of participants: 2
Phd Student:
Laursen, Bjarne (Intern)
Main Supervisor:
Skovgaard, Ove (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskerakademiets Samfinansier
Project: PhD

Development of a Decision Support System for Predicting Wear in Bulk and Sheet Forming Operation - PREDWEAR
The main objective of this project was to enhance available decision support systems used in the industrial design and optimisation practice in sheet and bulk metal forming to take into account the phenomena of wear. To meet this objective the research and development work has been performed in five main technical tasks dedicated to micromechanical modeling, laboratory testing, inverse analyses, finite element analyses and industrial applications.

Department of Manufacturing Engineering
Institute for Product Development
Department of Informatics and Mathematical Modeling
Rockfield Software Ltd
Universitat Politècnica de Catalunya
Matrix Sa
University of Padua
Techint Compagnia Tecnica Internazionale S.p.A.
Mr. Gomez de Dios, Candemat Sa

British Steel
Period: 01/12/1992 → 30/11/1996
Number of participants: 10
Project participant:
Eriksen, Morten (Intern)
Lovato, Andrea (Intern)
Lassen, Søren (Intern)
Wanheim, Tarras (Ekstern)
Crook, Tony (Ekstern)
Onate, E. (Ekstern)
Heege, A. (Ekstern)
Bariani, P. (Ekstern)
Dvorkin, E. (Ekstern)
Project Manager, organisational:
Wanheim, Tarras (Intern)

Nonlinesrity in superconductivity and Josephson Junctions
Department of Mathematics
Period: 01/12/1992 → 17/03/1995
Number of participants: 2
Phd Student:
Lazarides, Nickos (Intern)
Main Supervisor:
Sørensen, Mads Peter (Intern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: Gammel Ordning - Blandet Finan
Project: PhD

signalbehandling anvendt til overvågning af distributionsnet

Department of Informatics and Mathematical Modeling
Period: 01/12/1992 → 24/08/1995
Number of participants: 4
Phd Student:
Munk, Steen M. (Intern)
Supervisor:
Pedersen, Knud Ole Helgesen (Intern)
Main Supervisor:
Sørensen, John Aasted (Intern)
Examiner:
Laubst, Torben (Ekstern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: ATV- Gammel ordning
Project: PhD

Evaluering og dimensionering af signalingssystemer for digitale kommunikationssystemer

Department of Informatics and Mathematical Modeling
Period: 01/11/1992 → 13/02/1996
Number of participants: 2
Phd Student:
Andersen, Allan T. (Intern)
Main Supervisor:
Nielsen, Bo Friis (Intern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: Gammel ordning u/skema-SU
Project: PhD

Computer-aided Design and Engineering in Electronic Engineering Education
TEMPUS Joint European Program (JEP-2031)
Department of Information Technology
Department of Informatics and Mathematical Modeling
Warsaw University of Technology
Technical University of Lodz
Institut National des Sciences Appliquees de Toulouse
University of York
Period: 01/09/1992 → 01/10/1996
Number of participants: 1
Project Manager, organisational:
Lindberg, Erik (Intern)

**Financing sources**
Source: Unknown
Name of research programme: Ukendt
Amount: 1,000,000.00 Danish Kroner
Digital kodning af talesignaler ved 600 bit/sek

Department of Informatics and Mathematical Modeling
Period: 01/08/1992 → 08/02/1996
Number of participants: 3
Phd Student: Thyssen, Jes (Intern)
Main Supervisor: Hansen, Steffen Duus (Intern)
Examiner: Sørensen, Helge Bjarup Dissing (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskerakademiets Samfinansier
Project: PhD

GODESS
Generic ODE Solving System Platform for solving systems of DAE’s Object Oriented software development Cooperation with LTH (Lund) and NTNU (Trondheim) The primary goal is to provide a tool for solving ODE’s and DAE’s that are appearing in applications as efficiently as possible. The platform that is developed allows for accurate comparisons between methods and algorithms involved in the solution process.

Department of Informatics and Mathematical Modeling
Norwegian University of Science and Technology
Lund University
Period: 01/08/1992 → 31/12/1999
Number of participants: 2
Project participant: Poulsen, Mikael Zebbelin (Intern)
Project Manager, organisational: Thomsen, Per Grove (Intern)

Klassisk og kvante-mekanisk behandling af lokalisering, blow-up og kaos i ikke-lineære systemer

Department of Informatics and Mathematical Modeling
Period: 01/08/1992 → 18/09/1995
Number of participants: 4
Phd Student: Jørgensen, Michael Finn (Intern)
Supervisor: Scott, Alwyn C. (Intern)
Main Supervisor: Sørensen, Mads Peter (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Gammel ordning u/skema-SU
Project: PhD

Numerisk lineær algebra på massivt parallele datamater

Department of Informatics and Mathematical Modeling
Period: 01/06/1992 → 02/08/1995
Number of participants: 2
Phd Student:
Balle, Susanne Mølleskov (Intern)
Main Supervisor:
Nielsen, Hans Bruun (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Gammel ordning u/skema-SU
Project: PhD

Stochastic Differential Equations and Biological System
Department of Informatics and Mathematical Modeling
Period: 01/06/1992 → 17/03/1995
Number of participants: 3
Phd Student:
Wang, Chunyan (Intern)
Main Supervisor:
Spliid, Henrik (Intern)
Examiner:
Vølund, Aage (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Centerfinansieret
Project: PhD

Variability in Microbiological Degradation Experiment - Analysis and Case Study
Department of Informatics and Mathematical Modeling
Period: 01/04/1992 → 30/09/1997
Number of participants: 2
Phd Student:
Sommer, Helle Mølgaard (Intern)
Main Supervisor:
Spliid, Henrik (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Centerfinansieret
Project: PhD

Digital styring og modellering af dynamiske systemer ved hurtig sampling.
Department of Informatics and Mathematical Modeling
Period: 01/03/1992 → 14/08/1995
Number of participants: 2
Phd Student:
Jensen, Morten Rostgaard (Intern)
Main Supervisor:
Poulsen, Niels Kjølstad (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsstipendium
Project: PhD

Komplekse dynamiske systemer.
Department of Mathematics
Period: 01/03/1992 → 16/12/1994
Number of participants: 2
Phd Student:
1-bit kodning af audiosignaler.

Department of Informatics and Mathematical Modeling
Period: 01/02/1992 → 01/03/1995
Number of participants: 3
Phd Student:
Risbo, Lars (Intern)
Supervisor:
Møller, Peter Koefoed (Ekstern)
Main Supervisor:
Sørensen, John Aasted (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-stipendium
Project: PhD

Generation of Ground Structures
Within topology optimization of trusses the ground structure approach has established itself as the prevailing method. The basic idea is to limit the optimization algorithm to a certain set of bars, as opposed to allowing it to choose freely between all available bars. Previously, ground structures has been generated more or less by hand. This project has attempted to explore the possibilities for automation of this process. Three reasonable geometrical selection criteria are considered: inclusion of the shortest (or longest) bars, omission of overlapping bars and finally the implementation of prescribing a design domain. Inspired by ideas from computer aided geometric design and traditional shape optimization the latter makes it possible to consider non-convex design areas - in 2D as well as in 3D.

Department of Mathematics
Department of Solid Mechanics
Aalborg University
Period: 01/02/1992 → 01/02/1996
Number of participants: 4
Project participant:
Bendsøe, Martin P. (Intern)
Pedersen, Pauli (Intern)
Rasmussen, J. (Ekstern)
Project Manager, organisational:
Smith, Ole P Pereira da Silva (Intern)

Koherente struktures dynamik
Department of Informatics and Mathematical Modeling
Period: 01/02/1992 → 18/12/1995
Number of participants: 3
Phd Student:
Hesthaven, Jan (Intern)
Main Supervisor:
Thomsen, Per Grove (Intern)
Examiner:
Sørensen, Jens Nørkær (Intern)

Financing sources
Methods for analysis and dimensioning of heterogenous telecommunication networks

Department of Informatics and Mathematical Modeling
Period: 01/02/1992 → 24/04/1995
Number of participants: 2
PhD Student:
Møller, Dorte Marianne (Intern)
Main Supervisor:
Nielsen, Bo Friis (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskerakademiets Samfinansier
Project: PhD

Optimizing a lattice construction's topology.

Department of Mathematics
Period: 01/02/1992 → 29/05/1996
Number of participants: 3
PhD Student:
Smith, Ole P Pereira da Silva (Intern)
Main Supervisor:
Bendsøe, Martin P. (Intern)
Examiner:
Olhoff, Niels (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: samarbejdsaftale-finans.
Project: PhD

Robust adaptive control system design for aerospace applications.

Department of Informatics and Mathematical Modeling
Period: 01/02/1992 → 21/03/1997
Number of participants: 7
PhD Student:
Hansen, Anca Daniela (Intern)
Supervisor:
Colding-Jørgensen, Morten (Ekstern)
Moskilde, Erik (Intern)
Main Supervisor:
Poulsen, Niels Kjølstad (Intern)
Examiner:
Knudsen, Carsten (Intern)
Bakker, Barbara Marleen (Ekstern)
Sørensen, Preben Graae (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Selvfinansierende (privatist)
Project: PhD

Truss Topology Optimization against Local Buckling Conditions
This project has reconsidered a truss topology optimization algorithm originated by Pedersen. The algorithm considers local buckling effects within each bar due to static equilibrium of the overall design. This results in a non-convex cost function. In this project this framework is extended to allow for ground structures and the effect of the restriction of the
possible bars to non-convex design domains are investigated. In another branch of the project an important deficiency in previously developed methods to the local buckling problem is considered and a possible solution procedure is developed. Consider a bar in a generated design and add a node to the internal part of this bar. Due to the non-linearity and concavity of the objective function, the cost of the two small bars is lower than the cost of the long bar. In this case, the bar should be considered as one long bar. However, if a third bar is added connecting to the internal node, the long bar should be modelled as two short bars. An objective evaluation has been implemented evaluating the correct design cost in these situations. The concept of chains as a generalization of bars, to line segments with two or more spanning nodes, is introduced. Moreover, indexing of designs as a simple count of the number of bars in the design connecting to each node is considered. Despite its simplicity design indices allows for efficient localization of critical nodes. From the point of view of static equilibrium the critical nodes are the nodes where the constraining force equilibrium matrix displays linear dependencies.

Department of Mathematics
Department of Solid Mechanics
Period: 01/02/1992 → 01/02/1996
Number of participants: 3
Project participant:
Bendsøe, Martin P. (Intern)
Pedersen, Pauli (Intern)
Project Manager, organisational:
Smith, Ole P Pereira da Silva (Intern)
Project

Verifikation af parallele systemer
Department of Informatics and Mathematical Modeling
Period: 01/02/1992 → 22/12/1998
Number of participants: 2
Phd Student:
Nyblad, Kasten (Intern)
Main Supervisor:
Sharp, Robin (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskerakademiets Samfinansier
Project: PhD

Asynchronous Circuit Design
Asynchronous circuits operate without a global clock signal - the flow of data is controlled by local handshaking between modules and registers. This gives asynchronous circuits some unique characteristics that can be exploited to advantages (higher speed, lower power consumption, modularity and robustness). The research addresses methods and techniques for designing efficient circuits, and in particular circuits with low power consumption. The experimental part of this work is based on industrial applications and involves design and fabrication of various prototype IC's. From 2001 the activities have focused on high-level synthesis of asynchronous circuits and on network-on-chip. The activity represents a long term effort and it is funded through a number of sources including the ACiD working group (IST-1999-29119), the Thomas B. Thrige Foundation and a donation from Nokia.

Department of Information Technology
Department of Informatics and Mathematical Modeling
Period: 01/01/1992 → 01/01/9999
Number of participants: 5
Project participant:
Nielsen, Sune Faligaard (Intern)
Mahadevan, Shankar (Intern)
Bjerregaard, Tobias (Intern)
Project Manager, organisational:
Sparsø, Jens (Intern)
Madsen, Jan (Intern)
Project
Blood Velocity Estimation with Frequency Modulated Ultrasound

This project investigates the applicability of coherent, linearly frequency modulated (FM) excitation signals for blood velocity measurements. Systems based on such excitation signals are called FM Doppler systems. By utilizing FM signals, it is possible to avoid the high peak energy emitted with conventional pulsed wave Doppler systems. In an echo-ranging system, everything else equal, the range resolution size is inversely proportional to the bandwidth of the emitted signal. Thus, if the range resolution is to be improved in a PW Doppler system, the time duration of the emitted burst must be reduced. On the other hand, if the signal to noise ratio is to remain unchanged, the mean emitted power must also be kept constant, which requires increased peak emitted power. However, from a design point of view, a high peak to average power is undesirable, as the duty cycle diminish and non-linear propagation may occur. In addition, especially for medical applications, the peak power level might in certain situations exceed the regulatory limits for diagnostic ultrasound equipment. We have shown that the signal processing principles, utilized with Pulsed Wave - time shift measurement Doppler (PW-tsm), can be used with FM excitation signals as well. The FM counterpart to the PW-tsm technique is spectral cross-correlation, and such a system is called Frequency Modulation - frequency shift measurement, FM-fsm. Experimental data, recorded at Worcester Polytechnic Institute, has been processed with an improved version of the fsm signal processing technique. The promising results show that the FM technique has a precision comparable to that of the PW technique.

Algebraic Decoding Methods

For several classes of error-correcting block codes, decoding may be performed by solving equations in suitable number systems and doing similar calculations. Reed-Solomon codes are of particular interest in applications, but recently codes constructed using algebraic geometry have been studied extensively. New versions of the decoding algorithms are being investigated in order to correct more errors or improve implementations.
CONNECT, Computational Neural Network Center

The Computational Neural Network Center was established March 1, 1991. The center's main research objective is actively to promote and support the collaboration between Danish researchers in theory, implementation and application of neural computation. An additional objective is to establish a graduate level training in the subject of artificial neural networks. In 1993 a plan funded by the Danish Research councils extended CONNECT for the period 1994-1996. The research plan is now centered around two projects: a theory project at the Niels Bohr Institute and the neural signal processing project at the Technical University of Denmark. Neural networks form an attractive framework for development of non-linear signal processing systems. They allow for system specification by "example" and thereby avoid explicit modeling. Arbitrary transfer functions may be modeled and neural net programs are "born" parallel facilitating implementation on massively parallel hardware. Theoretical tools for studying learning dynamics and generalization have matured considerably. Generalization, i.e., the ability to perform well on data not seen during adaptation, is the key concept for network design and evaluation. The research in 1996 concerned design, evaluation and visualization of non-linear adaptive models. A novel criterion for network pruning based on the generalization theory was formulated. A method for fast approximate crossvalidation of adaptive models was developed, and applied to system identification. The first scheme for generalization based evaluation of unsupervised learning algorithms was published and applied to optimization of Principal Component Analysis and k-Means Clustering. The Boltzmann Machine Learning Rule was generalized and applied to parameter estimation in inhomogeneous Markov Fields. The generalized form of the Boltzmann Machine network becomes susceptible to the generic tools for design and evaluation previously developed.

Department of Informatics and Mathematical Modeling

University of Copenhagen

Period: 01/03/1991 → ...
Number of participants: 14

Project participant:

Larsen, Jan (Intern)
Goutte, Cyril (Intern)
Ohlsson, Børje Ola Mattias (Intern)
Toft, Peter Aundal (Intern)
Fog, Torben L. (Intern)
March, Niels J.S. (Intern)
Pedersen, Morten With (Intern)
Hintz-Madsen, Mads (Intern)
Kjems, Ulrik (Intern)
Nielsen, Johannes Kristoffer (Intern)
Lautrup, Benny (Ekstern)
Solla, Sara (Ekstern)
Winter, Ole (Ekstern)

Project Manager, organisational:

Hansen, Lars Kai (Intern)

Financing sources

Source: Unknown
Name of research programme: Ukendt
Amount: 5,000,000.00 Danish Kroner

Invers spektral Geometri

Department of Mathematics
Period: 01/02/1991 → 21/03/1994
Number of participants: 2
Phd Student:
Simonsen, Annette (Intern)
Main Supervisor:
Markvorsen, Steen (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsstipendium
Project: PhD

Type systems for specifications languages
Department of Informatics and Mathematical Modeling
Period: 01/02/1991 → 03/11/1994
Number of participants: 3
Phd Student:
Damm, Flemming M. (Intern)
Supervisor:
Hansen, Bo Stig (Intern)
Main Supervisor:
Bruun, Hans (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-stipendium
Project: PhD

Varifolds-geometrisk målteori
Department of Mathematics
Period: 01/02/1991 → 17/03/1995
Number of participants: 2
Phd Student:
Kristensen, Jan (Intern)
Main Supervisor:
Hansen, Vagn Lundsgaard (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-stipendium
Project: PhD

European Consortium for Mathematics in Industry (ECMI)
The goal of ECMI is to promote the interaction between universities and research groups in industry. The aims of ECMI are to promote the use of mathematical models in industry, to educate industrial mathematicians to meet the growing demand for such experts and finally to operate on a European scale. Activities comprises: Attracting EU funding for post docs and research in industrial mathematics, student exchange through ERASMUS, organizing ECMI modelling weeks, biannual conferences, European Study Groups for Industry (ESGI), and others.

Department of Informatics and Mathematical Modeling
Department of Mathematics
Period: 01/01/1991 → …
Number of participants: 6
Project participant:
Poulsen, Niels Kjølstad (Intern)
Brøns, Morten (Intern)
Hjorth, Poul G. (Intern)
Skovgaard, Ove (Intern)
Christensen, Ole (Intern)
Identifikation og styring af spildevandsprocesser

Department of Informatics and Mathematical Modeling
Period: 01/01/1991 → 01/06/1994
Number of participants: 3
Phd Student:
Carstensen, Niels Jacob (Intern)
Main Supervisor:
Madsen, Henrik (Intern)
Examiner:
Harremoës, Poul (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: ATV- Gammel ordning
Project: PhD

Modelleringsmetoder for udstyr og programmel med henblik på automatisk generering af tekstbeskrivelser af dets funktion

Department of Informatics and Mathematical Modeling
Period: 01/12/1990 → 13/10/1993
Number of participants: 2
Phd Student:
Andersen, Asbjørn (Intern)
Main Supervisor:
Østerby, Tom (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: ATV- Gammel ordning
Project: PhD

Adaptive filtre til undertrykkelse af akustisk ekko i mobiltelefoner

Department of Informatics and Mathematical Modeling
Period: 01/09/1990 → 06/09/1995
Number of participants: 2
Phd Student:
Jensen, Søren Holdt (Intern)
Main Supervisor:
Sørensen, John Aasted (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Gammel ordning u/skema-SU
Project: PhD

Deltamodellering

Department of Informatics and Mathematical Modeling
Period: 01/09/1990 → 30/05/1994
Number of participants: 2
Phd Student:
Thygesen, Bent Georg (Intern)
Main Supervisor:
Poulsen, Niels Kjølstad (Intern)

Financing sources
Formelle metoder til test af parallele systemer

Department of Informatics and Mathematical Modeling
Period: 01/09/1990 → 05/07/1994
Number of participants: 2
PhD Student:
Binau, Ulla (Intern)
Main Supervisor:
Sharp, Robin (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Gammel ordning u/skema-SU
Project: PhD

Korrektthed af protokoller i distribuerede systemer

Department of Informatics and Mathematical Modeling
Period: 01/09/1990 → 22/04/1994
Number of participants: 2
PhD Student:
Søgaard-Andersen, Jørgen F. (Intern)
Main Supervisor:
Løvengreen, Hans Henrik (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Gammel ordning u/skema-SU
Project: PhD

Global optimization
A new method for global optimization is being developed. It is based on the same principles as the well established interval branch-and-bound method but without so severe limitations on the objective function. It only needs to be a smooth function (i.e. twice differentiable), calculated by a "black box" procedure. Stochastic methods, like simulated annealing and genetic algorithms also are used as sources of inspiration. Parallel processing is applied.

Department of Informatics and Mathematical Modeling
Period: 01/08/1990 → ...
Number of participants: 5
Project participant:
Stauning, Ole (Intern)
Zerchaninov, Serguei (Ekstern)
Zilinskas, Antanas (Ekstern)
Zilinskas, Julius (Ekstern)
Project Manager, organisational:
Madsen, Kaj (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 0.00 Danish Kroner
Project

Global semi-riemannsk geometri

Department of Mathematics
Period: 01/08/1990 → 01/02/1993
Number of participants: 2
Phd Student:
Mikkelsen, Michael Anker (Intern)
Main Supervisor:
Markvorsen, Steen (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Gammel ordning u/skema-SU
Project: PhD

Programudviklingsmodeller i et hypertekstbaseret informationssystem
Department of Informatics and Mathematical Modeling
Period: 01/07/1990 → 16/09/1993
Number of participants: 2
Phd Student:
Lange, Danny B (Intern)
Main Supervisor:
Bjørner, Dines (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: ATV- Gammel ordning
Project: PhD

Undersøgelser af kontrolstrategier for regulering af fjernvarmesystemer
Department of Informatics and Mathematical Modeling
Period: 01/07/1990 → 16/06/1994
Number of participants: 3
Phd Student:
Palsson, Olafur Petur (Intern)
Supervisor:
Ravn, Hans V. (Intern)
Main Supervisor:
Madsen, Henrik (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Nordisk finansiering
Project: PhD

Datalogisk retsvidenskab. Vidensreepresentation og inferens i forb. med menneskeskabte overenskomster og forskrifter
Department of Informatics and Mathematical Modeling
Period: 01/03/1990 → 15/08/1995
Number of participants: 3
Phd Student:
Karpf, Jørgen (Intern)
Supervisor:
Østerby, Tom (Intern)
Main Supervisor:
Nilsson, Jørgen Fischer (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Gammel ordning u/skema-SU
Project: PhD

Idenfifikation af dynamiske systemer i kontinuerd tid
Department of Informatics and Mathematical Modeling
Design of neural network filters
Department of Informatics and Mathematical Modeling
Period: 01/02/1990 → 01/01/1994
Number of participants: 2
Phd Student:
Larsen, Jan (Intern)
Main Supervisor:
Sørensen, John Aasted (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Gammel ordning u/skema-SU
Project: PhD

Formelle metoder til udvikling af parallele systemer
Department of Informatics and Mathematical Modeling
Period: 01/02/1990 → 30/01/1997
Number of participants: 2
Phd Student:
Grønning, Peter (Intern)
Main Supervisor:
Løvengreen, Hans Henrik (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Gammel ordning u/skema-SU
Project: PhD

Identifikation af varmedynamikken for bygningskomponenter

Department of Informatics and Mathematical Modeling

JRC
Lund Institute of Technology
Period: 01/01/1990 → …
Number of participants: 2
Project participant:
Melgaard, Henrik (Ekstern)
Project Manager, organisational:
Madsen, Henrik (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 400,000.00 Danish Kroner
Project

Meta-logiske teorier i datalogien
Department of Informatics and Mathematical Modeling
Period: 01/09/1989 → 06/09/1995
Number of participants: 3
Phd Student:
Villadsen, Jørgen (Intern)
Main Supervisor:
Nilsson, Jørgen Fischer (Intern)
Examiner:
Jensen, Hans Siggård (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-stipendium
Project: PhD

Identifikation og estimation af underliggende parametervariationer i stokastiske modeller
Department of Informatics and Mathematical Modeling
Period: 15/02/1989 → 30/05/1994
Number of participants: 3
Phd Student:
Søgaard, Henning Tangen (Intern)
Supervisor:
Holst, Jan (Intern)
Main Supervisor:
Madsen, Henrik (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Gammel ordning u/skema-SU
Project: PhD

Modelling and prediction of load in district heating systems
Department of Informatics and Mathematical Modeling
Period: 01/02/1989 → 01/02/1994
Number of participants: 2
Phd Student:
Sejling, Ken (Intern)
Main Supervisor:
Madsen, Henrik (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Gammel ordning u/skema-SU
Project: PhD

The Didactical Challenges of Mathematics
Internationally, mathematicians have become more and more aware of the importance of qualified dissemination of mathematical ideas and popularization of mathematics to a wider audience; not least of the importance of the generation of teaching material showing a perspective and adapted to the various levels in the educational system. In particular with roots in a number of geometrical subjects work is continuously done within this general scope and towards these goals. Also research in the history and philosophy of mathematics is part of the project.
Geometrisk modellering

Department of Informatics and Mathematical Modeling
Period: 01/02/1988 → 19/05/1995
Number of participants: 2
Phd Student:
Brown, Jan (Intern)
Main Supervisor:
Christensen, Niels Jørgen (Intern)

Computer Aided Control System Design (CACSD)
CACSD and CACE (Computer Aided Control Engineering) is a active field in international research. The new developments in computer hardware and software enables the development of new and enhanced tools and methodologies. Several subjects are treated in the departmental research: - User friendly interface construction in CACSD systems. - Implementation of device and system independent controller software. - Symbolic manipulation and representation in controller design - Development of standard methodologies and procedures for modelling of electromechanical systems. The department has both a HP 9000 UNIX server and PC platforms available for the research in this area. The software include MATLAB/Simulink including several toolboxes, Maple and Mathematica. More information may be found at http://www.iau.dtu.dk/research/control/CACE.html

Department of Automation
Department of Informatics and Mathematical Modeling
Period: 01/01/1988 → 01/01/1998
Number of participants: 3
Project participant:
Jannerup, Ole Erik (Intern)
Nørgård, Peter Magnus (Intern)
Project Manager, organisational:
Ravn, Ole (Intern)

System til optimal regulering af fjernvarme produktion
Period: 01/01/1988 → …
Number of participants: 3
Project participant:
Nielsen, Torben Skov (Intern)
Nielsen, Henrik Aalborg (Intern)
Project Manager, organisational:
Madsen, Henrik (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 1,780,000.00 Danish Kroner

Project
Udvikling og optimering af kemiske processer under anvendelse af statistiske korrelationsmetoder
Department of Informatics and Mathematical Modeling
Period: 01/09/1987 → 25/04/1995
Number of participants: 2
Phd Student:
Ersbøll, Annette Kjær (Intern)
Main Supervisor:
Spliid, Henrik (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Gammel ordning u/skema-SU

Project
Derivation and analysis of fifth order quadrature formulas for biharmonic boundary integral operators
Department of Informatics and Mathematical Modeling
Period: 01/01/1986 → 19/04/2001
Number of participants: 1
Project Manager, organisational:
Christiansen, Søren (Intern)

Project
Detecting non-uniqueness of solutions to biharmonic integral equations through SVD
Department of Informatics and Mathematical Modeling
Period: 01/01/1986 → 26/09/2001
Number of participants: 1
Project Manager, organisational:
Christiansen, Søren (Intern)

Project
Movement of surface gravity water waves in a canal expressed and computed by two systems of ordinary differential equations
The one system of ordinary differential equations is derived, the other system is known. The inherent properties of the two systems are compared and analysed in detail using the computer algebra system MAPLE. Subsequently the systems are solved numerically using appropriate methods.
Department of Informatics and Mathematical Modeling
Period: 01/01/1986 → …
Number of participants: 3
Project participant:
Thomsen, Per Grove (Intern)
Madsen, Per A. (Intern)
Project Manager, organisational:
Christiansen, Søren (Intern)
Using Maple V to derive and analyse a quadrature formula for a harmonic boundary integral operator

Department of Informatics and Mathematical Modeling
Period: 01/01/1986 → 29/08/2000
Number of participants: 1
Project Manager, organisational:
Christiansen, Søren (Intern)

Hypercalcaemia Discriminant Functions
Discriminant functions are developed as a diagnostic tool. The aim of the project is to provide a decision support which can alert the clinician in cases of hypercalcaemia. Secondary the system can indicate a possible diagnosis.

Department of Informatics and Mathematical Modeling
Period: 01/10/1985 → …
Number of participants: 6
Project participant:
Conradsen, Knut (Intern)
Froelich, Anne (Ekstern)
McNair, Peter (Ekstern)
Transboel, Lb (Ekstern)
Nielsen, Jan (Ekstern)
Project Manager, organisational:
Nielsen, Bo Friis (Intern)

Adaptive Control
In practice this implies that an adaptive controller is a controller with adjustable parameters, which is tuned on-line according to some mechanism in order to cope with time-variations in process dynamics and changes in the environment. This can be approached in different ways, but at IAU we focus primarily on the so-called indirect self-tuning regulators. A "pragmatic" approach to adaptive control is taken. We do not spend much time on stability proofs, but our research is primarily governed by implementation issues. We are continuously working on developing a set of software tools to facilitate practical implementation of adaptive controllers. Furthermore we are always interested in trying out adaptive methods on "real world" systems. This is also reflected in the DTU course "50360 Adaptive Control", taught by the department. The IRCST tool was originally implemented in an adaptive control context, but it has since then developed way beyond that. Today the tool contains an adaptive controller "template" and a "library" of building blocks for use in adaptive control. The library contains a number of utilities for control design, filtering, recursive estimation, and utilization of physical insight. A feature is the close connection to MATLAB. Matlab is an integrated part of the tool: filters, matrices, vectors, parameters, etc. are initialized in MATLAB and then send to the Real-time program. The results are then returned to MATLAB either during or after a run.

Department of Automation
CICT

Department of Informatics and Mathematical Modeling

Department of Electrical Engineering
Period: 01/01/1983 → 01/01/1993
Number of participants: 2
Project participant:
Nørgård, Peter Magnus (Intern)
Project Manager, organisational:
Ravn, Ole (Intern)

Solution of boundary value problems using the point collocation method
An analysis of the numerical properties of the method is carried out using, e.g., interval methods, stochastic methods and many-decimal methods. Collaborators: Armand Wirgin, Laboratoire de Mecanique et d'Acoustique, Marseille, France, Jean-Marie Chesneaux, Laboratoire MASI, Universite Paris VI, Paris, France, Poul Wulff Pedersen, UNI-C, DTU, Lyngby, Denmark. The project is carried out as part of the work prepared by the scientific staff at IMM. No specified budget. Albertsen, Niels Christian; Jean-Marie Chesneaux; Søren Christiansen and Armand Wirgin: Mathematics and
Applications of parameter estimation
Software for robust modelling of electromagnetic circuits is developed in collaboration with "Optimization Systems Associates", Canada.

On the elastostatic significance of four boundary integrals involving biharmonic functions
Using the computer algebra system Maple V it has been possible to ascribe an elastostatic significance to some boundary integrals. Publication: Christiansen, Søren: On the elastostatic significance of four boundary integrals involving biharmonic functions. Acta Mechanica 126 (1998) 37-43 Published 1998-01-12 The project is carried out as part of the work prepared by the scientific staff at IMM. No specified budget.

Integral equations for the fundamental biharmonic boundary value problem
Three pairs of equations have been derived and are analysed with respect to uniqueness.

Solution of integral equations
Quadrature methods for integral operators, derived from harmonic and biharmonic boundary integral equations are investigated with respect to their order of convergence. The project is carried out as part of the work prepared by the scientific staff at IMM. No specified budget. Christiansen, Søren: Detecting non-uniqueness of solutions to biharmonic integral equations through SVD. Department of Mathematical Modelling, Technical University of Denmark, DK-2800 Lyngby, Denmark ISSN 0909 6264 Technical Report IMM-REP-1999-10 1999-06-28, 17 pp. Christiansen, Søren:

Department of Informatics and Mathematical Modeling
Period: 01/06/1966 → ...
Number of participants: 2
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Project