Monge surfaces and planar geodesic foliations

A Monge surface is a surface obtained by sweeping a generating plane curve along a trajectory that is orthogonal to the moving plane containing the curve. Locally, they are characterized as being foliated by a family of planar geodesic lines of curvature. We call surfaces with the latter property PGF surfaces, and investigate the global properties of these two naturally defined objects. The only compact orientable PGF surfaces are tori; these are globally Monge surfaces, and they have a simple characterization in terms of the directrix. We show how to produce many examples of Monge tori and Klein bottles, as well as tori that do not have a closed directrix.
Robotic system and method for manufacturing of objects

The present disclosure relates to a method and a system for manufacturing a mould (17) for creation of complex objects, such as concrete objects, by controlling and moving two end effectors (1) of a robotic system, the two end effectors (1) having a flexible cutting element (3) attached to and extending between the two end effectors (1), the method comprising the steps of: defining at least one surface (8) representing the inner surface of the mould (17); dividing the surface (8) into a number of segments represented by planar curves (9, 11, 12) on the surface (8); for each planar curve, calculating at least one elastic curve representing the planar curve; for each calculated elastic curve, calculating a set of data corresponding to placement and direction of the two end effectors (1) for configuring the flexible cutting element to a shape corresponding to the calculated elastic curve; sequentially positioning the end effectors (1) according to each set of data.

General information
State: Published
Organisations: Department of Applied Mathematics and Computer Science, Mathematics
Authors: Gravesen, J. (Intern), Brander, D. (Intern), Bærentzen, J. A. (Ekstern), Markvorsen, S. (Intern), Bjerge Nørbjerg, T. (Intern), Hornbak Steenstrup, K. (Intern)
Publication date: 21 Sep 2017

Publication information
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Date: 21/09/2017
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Main Research Area: Technical/natural sciences
Source: espacenet
Source-ID: WO2017157917
Publication: Research › Patent – Annual report year: 2017
Pseudospherical surfaces with singularities

We study a generalization of constant Gauss curvature $-1$ surfaces in Euclidean 3-space, based on Lorentzian harmonic maps, that we call pseudospherical frontals. We analyse the singularities of these surfaces, dividing them into those of characteristic and non-characteristic type. We give methods for constructing all non-degenerate singularities of both types, as well as many degenerate singularities. We also give a method for solving the singular geometric Cauchy problem: construct a pseudospherical frontal containing a given regular space curve as a non-degenerate singular curve. The solution is unique for most curves, but for some curves there are infinitely many solutions, and this is encoded in the curvature and torsion of the curve.

General information
State: Published
Organisations: Department of Applied Mathematics and Computer Science, Mathematics
Authors: Brander, D. (Intern)
Pages: 905–928
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Main Research Area: Technical/natural sciences

Publication information
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Volume: 196
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BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
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Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 0.81 SJR 1.032 SNIP 0.96
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.128 SNIP 0.965 CiteScore 0.7
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.001 SNIP 0.858 CiteScore 0.74
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.911 SNIP 1.264 CiteScore 0.77
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.002 SNIP 0.933 CiteScore 0.73
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.494 SNIP 1.17 CiteScore 0.82
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.691 SNIP 1.17
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.257 SNIP 1.478
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.382 SNIP 1.432
Scopus rating (2007): SJR 0.806 SNIP 1.21
Scopus rating (2006): SJR 0.884 SNIP 1.197
Scopus rating (2005): SJR 0.379 SNIP 0.686
Scopus rating (2004): SJR 0.491 SNIP 0.667
Scopus rating (2003): SJR 0.524 SNIP 0.624
Scopus rating (2002): SJR 0.565 SNIP 0.718
Scopus rating (2001): SJR 0.77 SNIP 0.761
Scopus rating (2000): SJR 0.327 SNIP 0.482
Scopus rating (1999): SJR 0.533 SNIP 0.524
Original language: English
Differential geometry, Integrable systems, Loop groups, Pseudospherical surfaces, Constant Gauss curvature, Singularities

Electronic versions:
Rationalization in architecture with surfaces foliated by elastic curves
We develop methods for rationalization of CAD surfaces using elastic curves, aiming at a costeffective fabrication method for architectural designs of complex shapes. By moving a heated flexible metal rod though a block of expanded polystyrene, it is possible to produce shapes with both positive and negative Gaussian curvature, either for direct use or for use as moulds for concrete casting. If we can control the shape of the rod, while moving, we can produce prescribed shapes.

The flexible rod assumes at all times the shape of an Euler elastica (or elastic curve). The elastica are given in closed analytic form using elliptic functions. We use a gradient-driven optimization to approximate arbitrary planar curves by planar elastic curves. The method depends on an explicit parameterization of the space of elastic curves and on a method for finding a good initial guess for the optimization.

We approximate CAD surfaces by first extracting a collection of planar surface curves and approximating these by elastica. Providing the data for these curves to robots holding the flexible rod, we can produce an elastica-foliated surface that approximates the given CAD surface. Since not all surfaces can be closely approximated by an elastica-foliated surface, an arbitrary CAD surface must first be subdivided into segments that can be approximated. We discuss strategies for subdividing an arbitrary surface into segments that can be closely approximated, taking into account the aesthetics of the segmentation and the production constraints. If the given surface is smooth, we want the approximating surface to be smooth as well, so we must ensure smooth transition between the surface segments of the final result.

As an alternative to rationalization of arbitrary designs, we also present a method for direct generation of design surfaces using foliated Euler elastica. Here we work from a grid of blocks, so the segmentation is given, but we must still ensure smooth transition between segments.

General information
State: Published
Organisations: Department of Applied Mathematics and Computer Science, Mathematics
Authors: Nørbjerg, T. B. (Intern), Gravesen, J. (Intern), Brander, D. (Intern)
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Relations
Projects:
Rationalization in architecture with surfaces foliated by elastic curves
Publication: Research › Ph.D. thesis – Annual report year: 2017

Remarks on the boundary curve of a constant mean curvature topological disc
We discuss some consequences of the existence of the holomorphic quadratic Hopf differential on a conformally immersed constant mean curvature topological disc with analytic boundary. In particular, we derive a formula for the mean curvature as a weighted average of the normal curvature of the boundary curve, and a condition for the surface to be totally umbilic in terms of the normal curvature.

General information
State: Published
Organisations: Department of Applied Mathematics and Computer Science, Mathematics, Universidad De Granada
Surfaces foliated by planar geodesics: a model for curved wood design

Surfaces foliated by planar geodesics are a natural model for surfaces made from wood strips. We outline how to construct all solutions, and produce non-trivial examples, such as a wood-strip Klein bottle.

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Authors: Brander, D. (Intern), Gravesen, J. (Intern)
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Main Research Area: Technical/natural sciences
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Electronic versions:
Approximation by planar elastic curves

We give an algorithm for approximating a given plane curve segment by a planar elastic curve. The method depends on an analytic representation of the space of elastic curve segments, together with a geometric method for obtaining a good initial guess for the approximating curve. A gradient-driven optimization is then used to find the approximating elastic curve.

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BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.848 SNIP 1.06 CiteScore 1.3
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.161 SNIP 1.354 CiteScore 1.33
Web of Science (2015): Indexed yes
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Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.039 SNIP 1.604 CiteScore 1.5
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.05 SNIP 1.696 CiteScore 1.42
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.946 SNIP 1.347 CiteScore 1.11
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.311 SNIP 1.154
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.952 SNIP 1.643
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.761 SNIP 1.071
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.92 SNIP 1.08
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.062 SNIP 1.119
Designing for hot-blade cutting: Geometric Approaches for High-Speed Manufacturing of Doubly-Curved Architectural Surfaces

In this paper we present a novel method for the generation of doubly-curved, architectural design surfaces using swept Euler elastica and cubic splines. The method enables a direct design to production workflow with robotic hot-blade cutting, a novel robotic fabrication method under development by authors of the paper, which facilitates high-speed production of doubly-curved foam moulds. Complementary to design rationalisation, in which arbitrary surfaces are translated to hot-blade-cuttable geometries, the presented method enables architects and designers to design directly with the non-trivial constraints of blade-cutting in a bottom-up fashion, enabling an exploration of the unique architectural potential of this fabrication approach. The method is implemented as prototype design tools in Matlab, C++, GHPython, and Python and demonstrated through cutting of expanded polystyrene foam design examples.

General information
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Authors: Brander, D. (Intern), Bærentzen, J. A. (Intern), Clausen, K. (Ekstern), Fisker, A. (Intern), Gravesen, J. (Intern), Lund, M. N. (Ekstern), Nørbjerg, T. B. (Intern), Steenstrup, K. H. (Intern), Søndergaard, A. (Ekstern)
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Source-ID: 125814394
Publication: Research - peer-review › Article in proceedings – Annual report year: 2016

Hot Blade Cuttings for the Building Industries
The constructions of advanced architectural designs are presently very labour intensive, time consuming, and expensive. They are therefore only applied to a few prestige projects, and it is a major challenge for the building industry to bring the costs down and thereby offer the architects more variability in the (economically allowed) designs - i.e., to allow them to think outside the box. To address this challenge The Danish National Advanced Technology Foundation (now InnovationsFonden) is currently supporting the BladeRunner project that involves several Danish companies and public
institutions. The project aims to reduce the amount of manual labour as well as production time by applying robots to cut expanded polystyrene (EPS) moulds for the concrete to form doubly curved surfaces. The scheme is based upon the so-called Hot Wire or Hot Blade technology where the surfaces are essentially swept out by driving an Euler elastica through a block of EPS. This paper will be centered around the mathematical challenges encountered in the implementation of this idea. Since the elastica themselves are well known and described in the works of Euler et al. already in eighteenth century, these new challenges are mainly concerned with the rationalization of the architects’ CAD drawings into surfaces that can be created via this particular sweeping and cutting technology.

Spherical Surfaces
We study surfaces of constant positive Gauss curvature in Euclidean 3-space via the harmonicity of the Gauss map. Using the loop group representation, we solve the regular and the singular geometric Cauchy problems for these surfaces, and use these solutions to compute several new examples. We give the criteria on the geometric Cauchy data for the generic singularities, as well as for the cuspidal beaks and cuspidal butterfly singularities. We consider the bifurcations of generic one parameter families of spherical fronts and provide evidence that suggests that these are the cuspidal beaks, cuspidal
butterfly and one other singularity. We also give the loop group potentials for spherical surfaces with finite order rotational symmetries and for surfaces with embedded isolated singularities.

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Organisations: Department of Applied Mathematics and Computer Science, Mathematics
Authors: Brander, D. (Intern)
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Main Research Area: Technical/natural sciences

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Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.765 SNIP 0.947 CiteScore 0.62
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.621 SNIP 0.876 CiteScore 0.65
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.963 SNIP 1.24 CiteScore 0.85
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.926 SNIP 1.102 CiteScore 0.75
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.864 SNIP 1.221 CiteScore 0.7
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.736 SNIP 1.026 CiteScore 0.56
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.578 SNIP 0.982
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.915 SNIP 0.941
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.746 SNIP 1.164
Scopus rating (2007): SJR 0.654 SNIP 1.003
Scopus rating (2006): SJR 0.989 SNIP 1.122
Scopus rating (2005): SJR 0.858 SNIP 1.058
Scopus rating (2004): SJR 0.578 SNIP 0.994
Scopus rating (2003): SJR 0.758 SNIP 1.001
Scopus rating (2002): SJR 0.668 SNIP 0.807
Scopus rating (2001): SJR 1.115 SNIP 1.036
Scopus rating (2000): SJR 0.485 SNIP 1.116
Scopus rating (1999): SJR 0.323 SNIP 0.522
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Differential geometry, Integrable systems, Loop groups, Spherical surfaces, Constant Gauss curvature, Singularities, Cauchy problem
Electronic versions:
SphericalSurfacesAMSv3.pdf. Embargo ended: 01/03/2017
DOIs:
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Source: PublicationPreSubmission
Source-ID: 117999458
Deformations of constant mean curvature surfaces preserving symmetries and the Hopf differential

We define certain deformations between minimal and non-minimal constant mean curvature (CMC) surfaces in Euclidean space $E^3$ which preserve the Hopf differential. We prove that, given a CMC $H$ surface $f$, either minimal or not, and a fixed basepoint $z_0$ on this surface, there is a naturally defined family $f_h$, for all real $h$, of CMC $h$ surfaces that are tangent to $f$ at $z_0$, and which have the same Hopf differential. Given the classical Weierstrass data for a minimal surface, we give an explicit formula for the generalized Weierstrass data for the non-minimal surfaces $f_h$, and vice versa. As an application, we use this to give a well-defined dressing action on the class of minimal surfaces. In addition, we show that symmetries of certain types associated with the basepoint are preserved under the deformation, and this gives a canonical choice of basepoint for surfaces with symmetries. We use this to define new examples of non-minimal CMC surfaces naturally associated to known minimal surfaces with symmetries.
Surfaces with Natural Ridges

We discuss surfaces with singularities, both in mathematics and in the real world. For many types of mathematical surface, singularities are natural and can be regarded as part of the surface. The most emblematic example is that of surfaces of constant negative Gauss curvature, all of which necessarily have singularities. We describe a method for producing constant negative curvature surfaces with prescribed cusp lines. In particular, given a generic space curve, there is a unique surface of constant curvature $K = -1$ that contains this curve as a cuspidal edge. This is an effective means to easily generate many new and beautiful examples of surfaces with constant negative curvature.

Constant Gaussian curvature surfaces in the 3-sphere via loop groups

In this paper we study constant positive Gauss curvature $K$ surfaces in the 3-sphere $S^3$ with $0<K<1$, as well as constant negative curvature surfaces. We show that the so-called normal Gauss map for a surface in $S^3$ with Gauss curvature $K<1$ is Lorentz harmonic with respect to the metric induced by the second fundamental form if and only if $K$ is constant. We give a uniform loop group formulation for all such surfaces with $K\neq 0$, and use the generalized d'Alembert method to construct examples. This representation gives a natural correspondence between such surfaces with $K<0$ and those with $0<K<1$. 
Timelike Constant Mean Curvature Surfaces with Singularities

We use integrable systems techniques to study the singularities of timelike non-minimal constant mean curvature (CMC) surfaces in the Lorentz–Minkowski 3-space. The singularities arise at the boundary of the Birkhoff big cell of the loop group involved. We examine the behavior of the surfaces at the big cell boundary, generalize the definition of CMC surfaces to include those with finite, generic singularities, and show how to construct surfaces with prescribed singularities by solving a singular geometric Cauchy problem. The solution shows that the generic singularities of the generalized surfaces are cuspidal edges, swallowtails, and cuspidal cross caps.

General information
State: Published
Organisations: Department of Applied Mathematics and Computer Science, Mathematics, University of Southern Denmark
Authors: Brander, D. (Intern), Svensson, M. (Ekstern)
Pages: 1641-1672
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Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Geometric Analysis
Volume: 24
Issue number: 3
ISSN (Print): 1050-6926
Ratings:
BFI (2018): BFI-level 2
The geometric Cauchy problem for surfaces with Lorentzian harmonic Gauss maps

The geometric Cauchy problem for a class of surfaces in a pseudo-Riemannian manifold of dimension 3 is to find the surface which contains a given curve with a prescribed tangent bundle along the curve. We consider this problem for constant negative Gauss curvature surfaces (pseudospherical surfaces) in Euclidean 3-space, and for timelike constant non-zero mean curvature (CMC) surfaces in the Lorentz-Minkowski 3-space. We prove that there is a unique solution if the prescribed curve is non-characteristic, and for characteristic initial curves (asymptotic curves for pseudospherical surfaces and null curves for timelike CMC) it is necessary and sufficient for similar data to be prescribed along an additional characteristic curve that intersects the first. The proofs also give a means of constructing all solutions using loop group techniques. The method used is the infinite dimensional d'Alembert type representation for surfaces associated with Lorentzian harmonic maps (1-1 wave maps) into symmetric spaces, developed since the 1990's. Explicit formulae for the potentials in terms of the prescribed data are given, and some applications are considered.
Geometric Cauchy problems for spacelike and timelike CMC surfaces in $\mathbb{R}^{2,1}$

We discuss recent work of the author and collaborators on generalizations of Björling's classical problem to the case of constant non-zero mean curvature surfaces in 2+1-dimensional spacetime. The aim is to give an overview, and to point out the similarities and differences between the two cases of timelike and spacelike surfaces. Applications to the construction of CMC surfaces with prescribed singularities are also described.

General information
State: Published
Organisations: Department of Informatics and Mathematical Modeling, Geometry
Authors: Brander, D. (Intern)
Pages: 85-93
Publication date: 2012

Host publication information
Title of host publication: Differential Geometry of Submanifolds : Proceedings of RIMS Symposium
Publisher: Kyoto University

Series: RIMS Kokyuroku
Volume: 1775
ISSN: 1880-2818
Main Research Area: Technical/natural sciences

Singularities of spacelike constant mean curvature surfaces in Lorentz-Minkowski space

We study singularities of spacelike, constant (non-zero) mean curvature (CMC) surfaces in the Lorentz-Minkowski 3-space $L^3$. We show how to solve the singular Bjorling problem for such surfaces, which is stated as follows: given a real analytic null-curve $f(0)(x)$, and a real analytic null vector field $v(x)$ parallel to the tangent field of $f(0)$, find a conformally parameterized (generalized) CMC $H$ surface in $L^3$ which contains this curve as a singular set and such that the partial derivatives $f(x)$ and $f(y)$ are given by $df(0)/dx$ and $v$ along the curve. Within the class of generalized surfaces considered, the solution is unique and we give a formula for the generalized Weierstrass data for this surface. This gives a framework for studying the singularities of non-maximal CMC surfaces in $L^3$. We use this to find the Bjorling data - and holomorphic potentials - which characterize cuspidal edge, swallowtail and cuspidal cross cap singularities.

General information
State: Published
Organisations: Geometry, Department of Mathematics
Authors: Brander, D. (Intern)
Pages: 527-556
Publication date: 2011

Main Research Area: Technical/natural sciences

Publications
Journal: Cambridge Philosophical Society. Mathematical Proceedings
Volume: 150
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Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.849 SNIP 0.897 CiteScore 0.51
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.185 SNIP 1.329 CiteScore 0.69
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.192 SNIP 1.202 CiteScore 0.65
Holomorphic representation of constant mean curvature surfaces in Minkowski space: Consequences of non-compactness in loop group methods

We give an infinite dimensional generalized Weierstrass representation for spacelike constant mean curvature (CMC) surfaces in Minkowski 3-space $\mathbb{R}^{2,1}$. The formulation is analogous to that given by Dorfmeister, Pedit and Wu for CMC surfaces in Euclidean space, replacing the group $SU_2$ with $SU_{1,1}$. The non-compactness of the latter group, however, means that the Iwasawa decomposition of the loop group, used to construct the surfaces, is not global. We prove that it is defined on an open dense subset, after doubling the size of the real form $SU_{1,1}$, and prove several results concerning the behavior of the surface as the boundary of this open set is encountered. We then use the generalized Weierstrass representation to create and classify new examples of spacelike CMC surfaces in $\mathbb{R}^{2,1}$. In particular, we classify surfaces of revolution and surfaces with screw motion symmetry, as well as studying another class of surfaces for which the metric is rotationally invariant.
The Björling problem for non-minimal constant mean curvature surfaces.

The classical Bjorling problem is to find the minimal surface containing a given real analytic curve with tangent planes prescribed along the curve. We consider the generalization of this problem to non-minimal constant mean curvature (CMC) surfaces, and show that it can be solved via the loop group formulation for such surfaces. The main result gives a way to compute the holomorphic potential for the solution directly from the Bjorling data, using only elementary differentiation, integration and holomorphic extensions of real analytic functions. Combined with an Iwasawa decomposition of the loop group, this gives the solution, in analogy to Schwarz’s formula for the minimal case. Some preliminary examples of applications to the construction of CMC surfaces with special properties are given.
Generalized DPW method and an application to isometric immersions of space forms

General information
State: Published
Organisations: Technical University of Denmark, Technical University of Munich
Authors: Brander, D. (Intern), Dorfmeister, J. (Ekstern)
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BFI (2017): BFI-level 2
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 2
Scopus rating (2016): SJR 1.543 SNIP 1.115 CiteScore 0.71
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.48 SNIP 1.1 CiteScore 0.66
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.685 SNIP 1.238 CiteScore 0.76
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.594 SNIP 1.242 CiteScore 0.79
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.582 SNIP 1.339 CiteScore 0.8
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.39 SNIP 1.207 CiteScore 0.68
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.678 SNIP 1.229
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.57 SNIP 1.317
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 1.638 SNIP 1.414
Scopus rating (2007): SJR 1.625 SNIP 1.203
Scopus rating (2006): SJR 1.514 SNIP 1.122
Scopus rating (2005): SJR 1.5 SNIP 1.309
Scopus rating (2004): SJR 1.402 SNIP 1.109
Scopus rating (2003): SJR 1.528 SNIP 1.314
Scopus rating (2002): SJR 1.747 SNIP 1.207
Scopus rating (2001): SJR 1.751 SNIP 1.464
Scopus rating (2000): SJR 1.405 SNIP 1.152
Scopus rating (1999): SJR 1.543 SNIP 1.31
Original language: English
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A loop group formulation for constant curvature submanifolds of pseudo-Euclidean space

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Organisations: Department of Mathematics, Geometry, Kobe University
Authors: Brander, D. (Intern), Rossman, W. (Ekstern)
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Issue number: 7
ISSN (Print): 1027-5487
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BFI (2018): BFI-level 1
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BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.729 SNIP 0.818 CiteScore 0.81
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.554 SNIP 0.757 CiteScore 0.67
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.59 SNIP 0.995 CiteScore 0.75
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.51 SNIP 0.858 CiteScore 0.76
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.739 SNIP 0.788 CiteScore 0.7
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.622 SNIP 0.741 CiteScore 0.61
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.575 SNIP 0.65
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.654 SNIP 0.666
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.564 SNIP 0.836
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.47 SNIP 0.614
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 0.535 SNIP 0.891
Scopus rating (2005): SJR 0.461 SNIP 0.761
Scopus rating (2004): SJR 0.361 SNIP 0.865
Scopus rating (2003): SJR 0.432 SNIP 0.817
Scopus rating (2002): SJR 0.45 SNIP 0.609
Scopus rating (2001): SJR 0.198 SNIP 0.297
Scopus rating (2000): SJR 0.306 SNIP 0.558
Constant mean curvature surfaces in Euclidean and Minkowski 3-spaces

Grassmann geometries and integrable systems
Loop group decompositions in almost split real forms and applications to soliton theory and geometry

General information
State: Published
Organisations: Geometry, Department of Mathematics
Authors: Brander, D. (Intern)
Pages: 1792-1800
Publication date: 2008
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Geometry and Physics
Volume: 58
Issue number: 12
ISSN (Print): 0393-0440
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.793 SNIP 0.96 CiteScore 0.82
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.691 SNIP 1.185 CiteScore 0.77
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.838 SNIP 1.372 CiteScore 0.97
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.661 SNIP 0.958 CiteScore 0.85
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.676 SNIP 1.162 CiteScore 0.91
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.594 SNIP 1.096 CiteScore 0.81
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.609 SNIP 0.894
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.694 SNIP 0.93
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.772 SNIP 1.14
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.832 SNIP 1.114
Scopus rating (2006): SJR 0.708 SNIP 1.143
Scopus rating (2005): SJR 0.571 SNIP 0.754
Scopus rating (2004): SJR 0.836 SNIP 1.167
Scopus rating (2003): SJR 0.857 SNIP 1.255
Scopus rating (2002): SJR 0.936 SNIP 1.097
Scopus rating (2001): SJR 0.725 SNIP 0.985
Scopus rating (2000): SJR 0.992 SNIP 1.09
Results related to generalizations of Hilbert's non-immersibility theorem for the hyperbolic plane

General information
State: Published
Organisations: Technical University of Denmark
Authors: Brander, D. (Intern)
Pages: 8-16
Publication date: 2008
Main Research Area: Technical/natural sciences

Publication information
Journal: Electronic Research Announcements in Mathematical Sciences
Volume: 15
ISSN (Print): 1935-9179
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 2
Scopus rating (2016): SJR 0.287 SNIP 1.31 CiteScore 0.44
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 0.478 SNIP 0.975 CiteScore 0.76
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 0.537 SNIP 0.69 CiteScore 0.39
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.415 SNIP 0.688 CiteScore 0.72
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 2.091 SNIP 1.313 CiteScore 0.71
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.037 SNIP 1.82 CiteScore 1
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.387 SNIP 1.651
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.249 SNIP 1.015
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 0.772 SNIP 1.076
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.036 SNIP 1.045
Scopus rating (2006): SJR 1.355 SNIP 1.279
Scopus rating (2005): SJR 0.615 SNIP 1.07
Scopus rating (2004): SJR 0.221 SNIP 0.263
Scopus rating (2003): SJR 0.17 SNIP 0.239
Scopus rating (2002): SJR 0.112 SNIP 0.166
Scopus rating (2001): SJR 0.168 SNIP 0.395
An application of a 3-involution loop group to reflective submanifolds

General information
State: Published
Organisations: Technical University of Denmark
Authors: Brander, D. (Intern)
Pages: 1334-1337
Publication date: 2007

Host publication information
Title of host publication: Mathematisches Forschungsinstitut Oberwolfach Report
Volume: 24/2007
Publisher: Mathematisches Forschungsinstitut Oberwolfach
Main Research Area: Technical/natural sciences
Conference: Progress in Surface Theory, Oberwolfach, 01/01/2007
Links:
http://www.mfo.de/cgi-bin/path.cgi-bin/tagung_espe?type=21&tnr=0718b
Source: orbit
Source-ID: 224180
Publication: Research › Article in proceedings – Annual report year: 2007

Curved flats, pluriharmonic maps and constant curvature immersions into pseudo-Riemannian space forms

General information
State: Published
Organisations: Technical University of Denmark
Authors: Brander, D. (Intern)
Pages: 253-275
Publication date: 2007
Main Research Area: Technical/natural sciences

Publication information
Journal: Annals of Global Analysis and Geometry
Volume: 32
ISSN (Print): 0232-704X
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 0.71 SJR 0.813 SNIP 0.949
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.16 SNIP 1.051 CiteScore 0.8
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.94 SNIP 1.19 CiteScore 0.73
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.225 SNIP 1.149 CiteScore 0.72
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.063 SNIP 1.211 CiteScore 0.81
Grassmann geometries in infinite dimensional homogeneous spaces and an application to reflective submanifolds

General information
State: Published
Organisations: Technical University of Denmark
Authors: Brander, D. (Intern)
Publication date: 2007
Main Research Area: Technical/natural sciences

Publication information
Journal: International Mathematics Research Notices
Volume: 2007
ISSN (Print): 1073-7928
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 0.74 SJR 1.531 SNIP 0.965
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.088 SNIP 1.21 CiteScore 0.84
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.526 SNIP 1.27 CiteScore 0.93
BFI (2013): BFI-level 2
Flat submanifolds of a sphere and integrable systems

General information
State: Published
Organisations: Technical University of Denmark
Authors: Brander, D. (Intern)
Number of pages: 41
Publication date: 2006

Publication information
Original language: English
Main Research Area: Technical/natural sciences

Bibliographical note
Australian National University
Source: orbit
Source-ID: 224164
Publication: Research › Ph.D. thesis – Annual report year: 2006

Finite type isometric immersions of constant curvature submanifolds

General information
State: Published
Organisations: Technical University of Denmark
Authors: Brander, D. (Intern)
Host publication Information
Title of host publication: Integrable systems, geometry and visualization
Main Research Area: Technical/natural sciences
Conference: Integrable systems, geometry and visualization, Kyushu University, Japan, 01/01/2004
Source: orbit
Source-ID: 224181
Publication: Research › Article in proceedings – Annual report year: 2004

Projects:

Surface Design and Rationalization for Robotic Hotwire and Hotblade Cutting Techniques
Technical University of Denmark
Period: 15/12/2015 → 14/12/2018
Number of participants: 4
Phd Student:
Fisker, Ann-Sofie (Intern)
Supervisor:
Bærentzen, Jakob Andreas (Intern)
Gravesen, Jens (Intern)
Main Supervisor:
Brander, David (Intern)

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

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)
Project

BladeRunner - Applied Geometry
Technical University of Denmark
Period: 01/06/2013 → 26/10/2016
Number of participants: 6
Phd Student:
Nørbjerg, Toke Bjerge (Intern)
Supervisor:
Brander, David (Intern)
Main Supervisor:
Gravesen, Jens (Intern)
Examiner:
Røgen, Peter (Intern)
Poltier, Konrad (Ekstern)
Wallner, Johannes (Ekstern)

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

Relations
Publications:
Rationalization in architecture with surfaces foliated by elastic curves
Project: PhD

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