The dynamics of magnetic vortices in type II superconductors with pinning sites studied by the time dependent Ginzburg–Landau model

We investigate the dynamics of magnetic vortices in type II superconductors with normal state pinning sites using the Ginzburg–Landau equations. Simulation results demonstrate hopping of vortices between pinning sites, influenced by external magnetic fields and external currents. The system is highly nonlinear and the vortices show complex nonlinear dynamical behaviour.

General information
State: Published
Organisations: Department of Applied Mathematics and Computer Science, Dynamical Systems, Örebro University
Authors: Sørensen, M. P. (Intern), Pedersen, N. F. (Intern), Ögren, M. (Ekstern)
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BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.497 SNIP 0.83 CiteScore 0.85
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ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.55 SNIP 0.621 CiteScore 0.79
ISI indexed (2012): ISI indexed yes
Negative Differential Resistance due to Nonlinearities in Single and Stacked Josephson Junctions

Josephson junction systems with a negative differential resistance (NDR) play an essential role for applications. As a well-known example, long Josephson junctions of the BSCCO type have been considered as a source of terahertz radiation in recent experiments. Numerical results for the dynamics of the fluxon system have demonstrated that a cavity induced NDR plays a crucial role for the emission of electromagnetic radiation. We consider the case of an NDR region in the McCumber curve itself of a single junction and found that it has an effect on the emission of electromagnetic radiation. Two different shapes of NDR region are considered, and we found that it is essential to distinguish between current bias and voltage bias.

General information
State: Published
Organisations: Department of Applied Mathematics and Computer Science, Dynamical Systems, University of Sannio
Authors: Filatrella, G. (Ekstern), Pierro, V. (Ekstern), Pedersen, N. F. (Intern), Sørensen, M. P. (Intern)
Number of pages: 7
Publication date: 2014
Main Research Area: Technical/natural sciences

Publication information
Journal: IEEE Transactions on Applied Superconductivity
Volume: 24
Issue number: 6
Negative differential resistance in Josephson junctions coupled to a cavity

Regions with negative differential resistance can arise in the IV curve of Josephson junctions and this phenomenon plays an essential role for applications, in particular for THz radiation emission. For the measurement of high frequency radiation from Josephson junctions, a cavity – either internal or external – is often used. A cavity may also induce a negative differential resistance region at the lower side of the resonance frequency. We investigate the dynamics of Josephson junctions with a negative differential resistance in the quasi particle tunnel current, i.e., in the McCumber curve. We find that very complicated and unexpected interactions take place. This may be useful for the interpretation of experimental measurements of THz radiation from intrinsic Josephson junctions.

General information
State: Published
Organisations: Department of Applied Mathematics and Computer Science, Dynamical Systems, University of Sannio
Authors: Pedersen, N. F. (Intern), Filatrella, G. (Ekstern), Pierro, V. (Ekstern), Sørensen, M. P. (Intern)
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BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.575 SNIP 0.924 CiteScore 1.14
Web of Science (2016): Indexed yes
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BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.497 SNIP 0.83 CiteScore 0.85
Web of Science (2014): Indexed yes
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Scopus rating (2013): SJR 0.439 SNIP 0.7 CiteScore 0.79
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.55 SNIP 0.621 CiteScore 0.79
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.652 SNIP 0.607 CiteScore 0.94
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.63 SNIP 0.631
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.412 SNIP 0.56
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.67 SNIP 0.576
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.532 SNIP 0.716
Scopus rating (2006): SJR 0.667 SNIP 0.556
An HTS machine laboratory prototype

This paper describes Superwind HTS machine laboratory setup which is a small scale HTS machine designed and build as a part of the efforts to identify and tackle some of the challenges the HTS machine design may face. One of the challenges of HTS machines is a Torque Transfer Element (TTE) which is in this design integral part of the cryostat. The discussion of the requirements for the TTE supported with a simple case study comparing a shaft and a cylinder as candidates for TTE are presented. The discussion resulted with a cylinder as a TTE design rated for a 250Nm and with more than 10 times lower heat conduction compared to a shaft. The HTS machine was successfully cooled to 77K and tests have been performed. The IV curves of the HTS field winding employing 6 HTS coils indicate that two of the coils had been damaged. The maximal value of the torque during experiments of 78Nm was recorded. Loaded with 33%, the TTE performed well and showed sufficient margin for future experiments.

General information
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Organisations: Department of Electrical Engineering, Electric Components, Department of Wind Energy, Wind Energy Systems, Department of Mathematics, Dynamical systems
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ISI indexed (2011): ISI indexed no
Scopus rating (2010): SJR 0.219 SNIP 0.322
Scopus rating (2009): SJR 0.198 SNIP 0.43
Computation of Superconducting Generators for Wind Turbine Applications

The idea of introducing a superconducting generator for offshore wind turbine applications has received increasing support. It has been proposed as a way to meet energy market requirements and policies demanding clean energy sources in the near future. However, design considerations have to take into account hysteresis losses in the superconducting windings during transient responses. Modeling and simulation of these transients is a challenging task. It requires considering a system that spans spatially 5 (or 6) orders of magnitude: from the 1 µm thick superconducting layers in the windings, to the actual generators in the KW (MW) class with an expected cross section in the order of decimeters (meters).

This thesis work presents cumulative results intended to create a bottom-up model of a synchronous generator with superconducting rotor windings. In a first approach, multiscale meshes with large aspect ratio elements are used to simulate the electromagnetic properties of superconducting thin films. This provided a computational speedup of two to three orders of magnitude without compromising accuracy. A second approach used a homogeneous-medium anisotropic bulk with a power law E - J relationship to model stacks of superconducting tapes. This method provided an additional speedup of about two orders of magnitude when calculating AC losses in superconducting stacks.

The anisotropic bulk was latter used to model a generator with superconducting rotor windings. Transient response of the generator including ramp-up of rotor coils, load connection and change was simulated. Hence, transient hysteresis losses in the superconducting coils were computed. This allowed addressing several important design and performance issues such as critical current of the superconducting coils, electric load change rate, cryostat design and identification of quench-prone regions.

Self-consistent Ginzburg-Landau theory for transport currents in superconductors

We elaborate on boundary conditions for Ginzburg-Landau (GL) theory in the case of external currents. We implement a self-consistent theory within the finite element method (FEM) and present numerical results for a two-dimensional rectangular geometry. We emphasize that our approach can in principle also be used for general geometries in three-dimensional superconductors.
Self-consistent boundary conditions, Vortices, Ginzburg-Landau theory, Transport, FEM

Original language: English

Electronic versions:
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DOIs:
**Simulation of an HTS Synchronous Superconducting Generator**

In this work we present a simulation of a synchronous generator with superconducting rotor windings. As many other, electrical rotating machines, superconducting generators are exposed to ripple fields that could be produced from a wide variety of sources: short circuit, load change, mechanical torque fluctuations, etc. Unlike regular conductors, superconductors, experience high losses when exposed to AC fields. Thus, calculation of such losses is relevant for machine design to avoid quenches and increase performance. Superconducting coated conductors are well known to exhibit nonlinear resistivity, thus making the computation of heating losses a cumbersome task. Furthermore, the high aspect ratio of the superconducting materials involved adds a penalty in the time required to perform simulations.

The chosen strategy for simulation is as follows: A mechanical torque signal together with an electric load is used to drive the finite element model of a synchronous generator where the current distribution in the rotor windings is assumed uniform. Then, a second finite element model for the superconducting material is linked to calculate the actual current distribution in the windings of the rotor. Finally, heating losses are computed as a response to the electric load. The model is used to evaluate the transient response of the generator.

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**General information**

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Organisations: Department of Mathematics, Dynamical systems, Department of Wind Energy, Wind Energy Systems, Department of Electrical Engineering, Electric Components

Authors: Rodriguez Zermeno, V. M. (Intern), Abrahamsen, A. B. (Intern), Mijatovic, N. (Intern), Sørensen, M. P. (Intern), Jensen, B. B. (Intern), Pedersen, N. F. (Intern)

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ISI indexed (2013): ISI indexed no
Scopus rating (2012): SJR 0.293 SNIP 0.622 CiteScore 0.5
ISI indexed (2012): ISI indexed no
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ISI indexed (2011): ISI indexed no
Scopus rating (2010): SJR 0.219 SNIP 0.322
Scopus rating (2009): SJR 0.198 SNIP 0.43
Original language: English
Superconducting generator, AC losses, Finite Element Simulation; Homogenization, HTS coils

**Coil Optimization for High Temperature Superconductor Machines**

This paper presents topology optimization of HTS racetrack coils for large HTS synchronous machines. The topology optimization is used to acquire optimal coil designs for the excitation system of 3 T HTS machines. Several tapes are evaluated and the optimization results are discussed. The optimization algorithm is formulated to minimize the cost for the coils wound with one type of HTS as well as multiple HTS types. It could also be used to minimize other parameters, e.g. space required for the coils. The results are inherently highly dependent on the HTS properties, which at 20 K seem to be in favor of the 1 G tape. The maximal HTS savings achieved allowing multiple current supplies in the excitation system are investigated and estimated to be in the range of 50% for highly nonlinear J-B dependence HTS tapes.
High Temperature Superconductor Machine Prototype

A versatile testing platform for a High Temperature Superconductor (HTS) machine has been constructed. The stationary HTS field winding can carry up to 10 coils and it is operated at a temperature of 77K. The rotating armature is at room temperature. Test results and performance for the HTS field winding comprising four coils wound with two types of HTS tapes are shown and discussed. The field winding produces up to 0.62T in the 10mm air gap which constitutes 78% of the armature design value. Recommendations for the field winding operation are proposed and verified, which resulted in an increase of available magneto-motive force of the field winding up to 25%.

General information

State: Published
Organisations: Electric Components, Department of Electrical Engineering, Nano-Microstructures in Materials, Materials Research Division, Risø National Laboratory for Sustainable Energy, Dynamical systems, Department of Mathematics, Electric Energy Systems
Publication date: 2011

Host publication information

Title of host publication: International Conference on Electrical Machines and Systems
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Conference: International Conference on Electrical Machines and Systems 2011 : ICEMS 2011, Beijing, China, 01/01/2011
Winding, Torque, Steel, High temperature superconductors, Heat transfer, Coils
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Source-ID: 281866
Publication: Research - peer-review › Article in proceedings – Annual report year: 2011

HTS machine laboratory prototype

High Temperature Superconducting (HTS) electrical machines have the potential to offer outstanding technical performance with regards to efficiency and power density. However, the industry needs to address a large number of challenges in the attempt to harvest the full potential of HTS machines. Among others a few stand out, e.g. reliability and efficiency of thermal insulation and cooling systems; optimized torque transfer elements and current leads; commercial availability and competitiveness of HTS material etc. Also, HTS conductors lack standardization due to their rapid development where many of HTS properties are not known and need to be tested with a specific purpose in mind not just for different types of HTS conductors but also for the same type of HTS conductors made by different manufacturers. To address some of these challenges, we have constructed a laboratory prototype HTS machine. The machine comprises six
stationary HTS field windings wound from both YBCO and BISCOO tape operated at liquid nitrogen temperature and enclosed in a cryostat, and a three phase armature winding spinning at up to 300 rpm. This design has full functionality of HTS synchronous machines. The design details and experimental results are shown together with discussions about their implication for scaled up HTS machines.

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Organisations: Department of Electrical Engineering, Electric Components, Materials Research Division, Nano-Microstructures in Materials, Risø National Laboratory for Sustainable Energy, Dynamical systems, Department of Mathematics
Publication date: 2011

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HTS_machine_laboratory_prototype_1_1_.pdf
Source: orbit
Source-ID: 286177
Publication: Research › Sound/Visual production (digital) – Annual report year: 2011

Simulation of an HTS Synchronous Superconducting Generator
In this work we present a simulation of a synchronous generator with superconducting rotor windings. As many other electrical rotating machines, superconducting generators are exposed to ripple fields that could be produced from a wide variety of sources: short circuit, load change, etc. Unlike regular conductors, superconductors experience high losses when exposed to AC fields. Thus, calculation of such losses is relevant for machine design to avoid quenches and increase performance. Superconducting coated conductors are well known to exhibit nonlinear resistivity, thus making the computation of heating losses a cumbersome task. Furthermore, the high aspect ratio of the superconducting materials involved adds a penalty in the time required to perform simulations. The chosen strategy for simulation is as follows: A mechanical torque signal together with an electric load is used to drive the finite element model of a synchronous generator where the current distribution in the rotor windings is assumed uniform. Then, a second finite element model for the superconducting material is linked to calculate the actual current distribution in the windings of the rotor. Finally, heating losses are computed as a response to both the driving mechanical input and the electric load change. The model is used to evaluate the effect of including a damper cage as a protection in the event of a short circuit in the stator coils.

General information
State: Published
Organisations: Dynamical systems, Department of Mathematics, Materials Research Division, Nano-Microstructures in Materials, Risø National Laboratory for Sustainable Energy, Department of Electrical Engineering, Electric Components
Authors: Rodriguez Zermeno, V. M. (Intern), Abrahamsen, A. B. (Intern), Mijatovic, N. (Intern), Sørensen, M. P. (Intern), Jensen, B. B. (Intern), Pedersen, N. F. (Intern)
Publication date: 2011

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Main Research Area: Technical/natural sciences
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Source-ID: 284799
Publication: Research › Sound/Visual production (digital) – Annual report year: 2011

Stationary states and dynamics of superconducting thin films
The Ginzburg-Landau (GL) theory is a celebrated tool for theoretical modelling of superconductors [1]. We elaborate on different partial differential equations (PDEs) and boundary conditions for GL theory, formulated within the finite element method (FEM) [2]. Examples of PDEs for the calculation of stationary states with the GL equation and with the time-dependent GL equation are given. Moreover we study real time evolution with the so called Schrödinger-GL equation [3]. For simplicity we here present numerical data for a twodimensional rectangular geometry, but we emphasize that our FEM formulation can handle complex geometries also in a three-dimensional superconducting structure. To include external currents in our modelling we discuss the role of the boundary conditions for the external magnetic field [4]. Finally we show results for the pinning of vortices with controlled impurities.

General information
This work presents a method to simulate the electromagnetic properties of superconductors with high aspect ratio such as the commercially available second generation superconducting YBCO tapes. The method is based on a multiscale representation for both thickness and width of the superconducting domains. A couple of test cases were successfully simulated and further investigations were made by means of structured (mapped) meshes. Here, large aspect ratio elements were used to simulate thin material layers with a reduced number of elements. Hence, more complex geometries can be studied at considerable lower computational time. Several test cases were simulated including transport current, externally applied magnetic field and a combination of both. The results are in good agreement with recently published numerical simulations. The computational time to solve the present multiscale approach in 2D is estimated as two orders of magnitude faster than other 2D methods.
Magnetic Flux Lines in Complex Geometry Type-II Superconductors Studied by the Time Dependent Ginzburg-Landau Equation.

The time-dependent Ginzburg-Landau equation is solved numerically for type-II superconductors of complex geometry using the finite element method. The geometry has a marked influence on the magnetic vortex distribution and the vortex dynamics. We have observed generation of giant vortices at boundary defects, suppressing the superconducting state far into the superconductor.
Stacked Josephson junctions

Long Josephson junctions have for some time been considered as a source of THz radiation. We consider here a stack of Josephson junctions as a model for the anisotropic high temperature superconductors in particular those of the BSCCO family. Solitons (fluxons) moving coherently in such junctions is a possible source for radiation. Analytical computations of the bunched state as well as bunching inducing methods are discussed. A new model for the interpretation of THz radiation experiments is suggested.

General information
State: Published
Organisations: Department of Electrical Engineering, Electric Components, Department of Physics, Centre for Electric Technology
Stacked Josephson Junctions
Long Josephson junctions have for some time been considered as a source of THz radiation. Solitons moving coherently in the junctions is a possible source for this radiation. Analytical computations of the bunched state and bunching-inducing methods are reviewed. Experiments showing THz radiation have recently been reported and are discussed at the end of this chapter.

General information
State: Published
Organisations: Department of Electrical Engineering, Department of Mathematics, Department of Informatics and Mathematical Modeling
Authors: Madsen, S. F. (Intern), Pedersen, N. F. (Intern), Christiansen, P. L. (Intern)
Pages: 163-186
Publication date: 2010

Superconducting generators for wind turbines: design considerations
The harmonic content of high temperature superconductors (HTS) field winding in air-core high temperature superconducting synchronous machine (HTS SM) has been addressed in order to investigate tendency of HTS SM towards mechanical oscillation and additional loss caused by higher flux harmonic. Both analytical expressions for flux distribution and current sheet distribution have been derived and analyzed. The two main contributors to the AC loss of HTS rotor winding are also identified and their influence addressed on general level.

General information
State: Published
Organisations: Electric Components, Department of Electrical Engineering, Nano-Microstructures in Materials, Materials Research Division, Risø National Laboratory for Sustainable Energy, Department of Mathematics
Authors: Mijatovic, N. (Intern), Abrahamsen, A. B. (Intern), Træholt, C. (Intern), Seiler, E. (Intern), Henriksen, M. (Intern), Rodríguez Zermeno, V. M. (Intern), Pedersen, N. F. (Intern)
Pages: 032038
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Main Research Area: Technical/natural sciences

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BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
We have examined the potential of 10 MW superconducting direct drive generators to enter the European offshore wind power market and estimated that the production of about 1200 superconducting turbines until 2030 would correspond to 10% of the EU offshore market. The expected properties of future offshore turbines of 8 and 10 MW have been determined from an up-scaling of an existing 5 MW turbine and the necessary properties of the superconducting drive train are discussed. We have found that the absence of the gear box is the main benefit and the reduced weight and size is secondary. However, the main challenge of the superconducting direct drive technology is to prove that the reliability is superior to the alternative drive trains based on gearboxes or permanent magnets. A strategy of successive testing of superconducting direct drive trains in real wind turbines of 10 kW, 100 kW, 1 MW and 10 MW is suggested to secure the accumulation of reliability experience. Finally, the quantities of high temperature superconducting tape needed for a 10 kW and an extreme high field 10 MW generator are found to be 7.5 km and 1500 km, respectively. A more realistic estimate is 200–300 km of tape per 10 MW generator and it is concluded that the present production capacity of coated conductors must be increased by a factor of 36 by 2020, resulting in a ten times lower price of the tape in order to reach a realistic price level for the superconducting drive train.
Superconducting wind turbines

**General information**
State: Published
Organisations: Rise National Laboratory for Sustainable Energy, Materials Research Division, Nano-Microstructures in Materials, Department of Electrical Engineering, Electric Components, Intelligent Energy Systems Programme, Composites and Materials Mechanics, Department of Physics, Quantum Physics and Information Technology, Department of Mathematics, Dynamical systems, Electric Energy Systems
Publication date: 2010
Event: Abstract from Dutch Power Innovation Day, Twente (NL), 11 Mar, .
Main Research Area: Technical/natural sciences
Materials and energy storage, Superconducting materials
Source: orbit
Source-ID: 272682
Publication: Research › Conference abstract for conference – Annual report year: 2010

Towards faster FEM simulation of thin film superconductors

**General information**
State: Published
Organisations: Electric Components, Department of Electrical Engineering, Dynamical systems, Department of Mathematics, Nano-Microstructures in Materials, Materials Research Division, Rise National Laboratory for Sustainable Energy
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Title of host publication: ECMI 2010 Conference
Main Research Area: Technical/natural sciences
Conference: ECMI 2010 Conference, Wuppertal, Germany, 01/01/2010
Materials and energy storage, Superconducting materials
Source: orbit
Source-ID: 271057
Publication: Research - peer-review › Article in proceedings – Annual report year: 2010

Design study of 10 kW superconducting generator for wind turbine applications

We have performed a design study of a 10 kW superconducting slow rotating generator suitable for demonstration in a small scale wind turbine, where the drive train only consists of the turbine blades connected directly to the generator. The flux density in the superconducting rotor is chosen as B = 1 Tesla to be similar to the performance of permanent magnets and to represent a layout, which can be scaled up in future off-shore wind turbines. The proposed generator is a 8 pole synchronous machine based on race-track coils of high temperature superconducting tapes and an air cored copper stator enclosed in an iron shield.

**General information**
State: Published
Fast 2D Simulation of Superconductors: a Multiscale Approach

This work presents a method to calculate AC losses in thin conductors such as the commercially available second generation superconducting wires through a multiscale meshing technique. The main idea is to use large aspect ratio elements to accurately simulate thin material layers. For a single thin superconductor, several standard test cases are simulated including transport current, externally applied magnetic field and a combination of both. The results are in good agreement with recently published numerical simulations and show even faster time to solution. A couple of examples involving several thin conductors in different circumstances are also shown.

General information
State: Published
Organisations: Dynamical systems, Department of Mathematics, Electric Components, Department of Electrical Engineering, Nano-Microstructures in Materials, Materials Research Division, Risø National Laboratory for Sustainable Energy
Authors: Rodríguez Zermeno, V. M. (Intern), Sørensen, M. P. (Intern), Pedersen, N. F. (Intern), Mijatovic, N. (Intern), Abrahamsen, A. B. (Intern)
Pages: 1-6
Publication date: 2009

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ISBN (Print): 978-0-9825697-2-6
Main Research Area: Technical/natural sciences
Conference: COMSOL conference, Milano, Italy, 01/01/2009
Multiscale Methods, Materials and energy storage, Coupling Variables, Mapped Mesh, Superconductors, Superconducting materials, AC-losses
Electronic versions:
Rodríguez_Zermeno09.pdf
Links:
Source: orbit
Source-ID: 252878
Publication: Research - peer-review › Article in proceedings – Annual report year: 2010

Return current in current-voltage characteristics of Intrinsic Josephson junctions.

General information
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Organisations: Electric Components, Department of Electrical Engineering, Centre for Electric Technology
Authors: Shukrinov, Y. M. (Ekstern), Irie, A. (Ekstern), Oya, G. (Ekstern), Suzuki, M. (Ekstern), Pedersen, N. F. (Intern), Seidel, P. (Ekstern)
Publication date: 2009

Host publication information
Superconducting generators for wind turbines

General information
State: Published
Organisations: Electric Components, Department of Electrical Engineering, Nano-Microstructures in Materials, Materials Research Division, Risø National Laboratory for Sustainable Energy, Department of Mathematics
Publication date: 2009

THz Generation Using Fluxon Dynamics in High Temperature Superconductors

We consider THz emission due to fluxon dynamics in a stack of inductively coupled long Josephson junctions connected electrically to a resonant cavity. By comparing to experiments on Josephson junction parametric amplifiers we consider the role of a negative resistance in connection with THz emission experiments. We suggest that indeed the negative resistance has a big influence on the experimental results.

General information
State: Published
Organisations: Electric Components, Department of Electrical Engineering, Aarhus University
Authors: Pedersen, N. F. (Intern), Madsen, S. (Ekstern)
Pages: 726-729
Publication date: 2009
Main Research Area: Technical/natural sciences
Analysis of a power grid using a Kuramoto-like model

We show that there is a link between the Kuramoto paradigm and another system of synchronized oscillators, namely an electrical power distribution grid of generators and consumers. The purpose of this work is to show both the formal analogy and some practical consequences. The mapping can be made quantitative, and under some necessary approximations a class of Kuramoto-like models, those with bimodal distribution of the frequencies, is most appropriate for the power-grid. In fact in the power-grid there are two kinds of oscillators: the "sources" delivering power to the "consumers".

General information
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Organisations: Electric Power Engineering, Department of Electrical Engineering, Centre for Electric Technology
Authors: Filatrella, G. (Ekstern), Nielsen, A. H. (Intern), Pedersen, N. F. (Intern)
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Publication information
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Design study of superconducting 10 kW demonstration generator for wind turbine applications

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Publication date: 2008

Host publication information
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Publisher: Danmarks Tekniske Universitet, Risø Nationallaboratoriet for Bæredygtig Energi
ISBN (Print): 978-87-550-3694-9
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 222832
Publication: Research - peer-review › Article in proceedings – Annual report year: 2008

FEM: a tool for designing a superconducting generator for a wind turbine

General information
State: Published
Organisations: Electric Power Engineering, Department of Electrical Engineering, Dynamical systems, Department of Mathematics, Nano-Microstructures in Materials, Materials Research Division, Risø National Laboratory for Sustainable Energy
Authors: Mijatovic, N. (Intern), Sørensen, M. P. (Intern), Abrahamsen, A. B. (Intern), Træholt, C. (Intern), Pedersen, N. F. (Intern)
Number of pages: 315
Publication date: 2008

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Title of host publication: Proceedings of the 29th International Symposium on Materials science
Main Research Area: Technical/natural sciences
Source: orbit
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Publication: Research › Article in proceedings – Annual report year: 2008

High-Q cavity-induced fluxon bunching in inductively coupled Josephson junctions
We consider fluxon dynamics in a stack of inductively coupled long Josephson junctions connected capacitively to a common resonant cavity at one of the boundaries. We study, through theoretical and numerical analyses, the possibility for the cavity to induce a transition from the energetically favored state of spatially separated shuttling fluxons in the different junctions to a high-velocity high-energy state of identical fluxon modes.

General information
State: Published
Organisations: Electric Components, Department of Electrical Engineering, Department of Informatics and Mathematical Modeling, Centre for Electric Technology, Aarhus University, University of California at Davis
Authors: Madsen, S. (Ekstern), Grønbech-Jensen, N. (Ekstern), Pedersen, N. F. (Intern), Christiansen, P. L. (Intern)
Pages: 174525
Publication date: 2008
Main Research Area: Technical/natural sciences

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Ratings:
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.16
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.933 SNIP 0.94 CiteScore 2.8
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.667 SNIP 1.262 CiteScore 3.3
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.785 SNIP 1.339 CiteScore 3.55
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 3.206 SNIP 1.394 CiteScore 3.57
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 3.382 SNIP 1.438 CiteScore 3.61
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 3.417 SNIP 1.451
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 3.109 SNIP 1.474
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 2.982 SNIP 1.524
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 2.923 SNIP 1.546
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 2.796 SNIP 1.56
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 2.763 SNIP 1.607
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 2.742 SNIP 1.606
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 2.75 SNIP 1.536
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 2.788 SNIP 1.706
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 2.946 SNIP 1.635
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 2.986 SNIP 1.631
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 3.115 SNIP 1.58
Original language: English
Josephson Junctions as a prototype for Synchronization of nonlinear Oscillators: From the Kuramoto model to the Utility power grid system

General information
State: Published
Organisations: Electric Power Engineering, Department of Electrical Engineering
Authors: Filatrella, G. (Ekstern), Pedersen, N. F. (Intern), Nielsen, A. H. (Intern)
Publication date: 2008

Host publication information
Title of host publication: Proceedings: 22nd General Conference of the Condensed Matter Division of the European Physical Society: SOC 27
Publisher: EDP Sciences
ISBN (Print): 2-914771-54-1
Main Research Area: Technical/natural sciences
Conference: The 22nd General Conference of the Condensed Matter Division of the European Physical Society: SOC 27, Rome, Italy, 01/01/2008
Source: orbit
Source-ID: 224567
Publication: Research - peer-review › Article in proceedings – Annual report year: 2008

Repulsive fluxons in a stack of Josephson junctions perturbed by a cavity
The BSCCO type intrinsic Josephson junction has been modeled as a stack of inductively coupled long Josephson junctions, which were described by a system of coupled sine-Gordon equations. In a system of 10 long Josephson junctions coupled to a linear cavity, we numerically investigate how the cavity perturbs fluxon motion in the junctions. Fluxons in neighboring junctions are repulsive leading to anti-phase motion. The cavity provides a force which perturbs this anti-phase motion, and may even force the fluxons to build a square lattice, i.e. to perform in-phase motion. For different values of the inductive coupling strength, we investigate the cavity current, fluxon phase difference, and current–voltage characteristic. The stack-cavity system with in-phase fluxon motion may be utilized as a THz oscillator.

General information
State: Published
Organisations: Electric Power Engineering, Department of Electrical Engineering, Department of Informatics and Mathematical Modeling
Authors: Madsen, S. (Ekstern), Pedersen, N. F. (Intern), Christiansen, P. L. (Intern)
Pages: 649-653
Publication date: 2008
Main Research Area: Technical/natural sciences

Publication information
Journal: Physica C: Superconductivity And its Applications
Volume: 468
Issue number: 7-10
ISSN (Print): 0921-4534
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Generalized coupling in the Kuramoto model

We propose a modification of the Kuramoto model to account for the effective change in the coupling constant among the oscillators, as suggested by some experiments on Josephson junction, laser arrays, and mechanical systems, where the active elements are turned on one by one. The resulting model is analytically tractable and predicts that both first and second order phase transitions are possible, depending upon the value of a new parameter that tunes the coupling among
the oscillators. Numerical simulations of the model are in accordance with the analytical estimates, and in qualitative agreement with the behavior of Josephson junctions coupled via a cavity.

**General information**

State: Published
Organisations: Electric Components, Department of Electrical Engineering
Authors: Filatrella, G. (Ekstern), Pedersen, N. F. (Intern), Wiesenfeld, K. (Ekstern)
Pages: 017201
Publication date: 2007
Main Research Area: Technical/natural sciences

**Publication information**

Volume: 75
Issue number: 1
ISSN (Print): 1539-3755
Ratings:
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.95 SJR 0.993 SNIP 0.896
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.047 SNIP 0.978 CiteScore 1.89
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.22 SNIP 1.123 CiteScore 2.05
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.311 SNIP 1.239 CiteScore 2.28
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.42 SNIP 1.226 CiteScore 2.28
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.485 SNIP 1.225 CiteScore 2.28
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.69 SNIP 1.215
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.694 SNIP 1.259
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.96 SNIP 1.314
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.926 SNIP 1.332
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.787 SNIP 1.324
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.71 SNIP 1.302
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 1.672 SNIP 1.214
Web of Science (2004): Indexed yes
Investigation of the breakpoint region in stacks with a finite number of intrinsic Josephson junctions

We study the breakpoint region on the outermost branch of current-voltage characteristics of the stacks with different number of intrinsic Josephson junctions. Effect of the boundary conditions on the breakpoint region is demonstrated. At periodic boundary conditions the breakpoint region is absent for stacks with even number of junctions. For stacks with odd number of junctions and for stacks with nonperiodic boundary conditions the breakpoint current is increased with number of junctions and saturated at the value corresponding to the periodic boundary conditions. The region of saturation and the saturated value depend on the coupling between junctions. We explain the results by the parametric resonance at the breakpoint and excitation of the longitudinal plasma wave by the Josephson oscillations. A way for the diagnostics of the junctions in the stack is proposed.

General information
State: Published
Organisations: Electric Power Engineering, Department of Electrical Engineering
Authors: Shukrinov, Y. M. (Ekstern), Mahfouzi, F. (Ekstern), Pedersen, N. F. (Intern)
Pages: 104508
Publication date: 2007
Main Research Area: Technical/natural sciences

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Volume: 75
Issue number: 10
ISSN (Print): 1098-0121
Ratings:
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.16
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BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.933 SNIP 0.94 CiteScore 2.8
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.667 SNIP 1.262 CiteScore 3.3
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.785 SNIP 1.339 CiteScore 3.55
Long Josephson Junction Stack Coupled to a Cavity

A stack of inductively coupled long Josephson junctions are modeled as a system of coupled sine-Gordon equations. One boundary of the stack is coupled electrically to a resonant cavity. With one fluxon in each Josephson junction, the inter-junction fluxon forces are repulsive. We look at a possible transition, induced by the cavity, to a bunched state.
Search for in-phase Josephson vortex solutions in BSCCO type junctions: modelling and numerical simulations

General information
State: Published
Organisations: Electric Power Engineering, Department of Electrical Engineering, Centre for Electric Technology
Authors: Pedersen, N. F. (Intern), Madsen, S. P. (Intern)
Pages: 1-5
Publication date: 2007
Main Research Area: Technical/natural sciences

Publication information
Journal: Superconductor Science and technology
Volume: 20
Issue number: 2
ISSN (Print): 0953-2048
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.849 SNIP 1.261 CiteScore 2.07
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.796 SNIP 1.343 CiteScore 2.08
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.054 SNIP 1.178 CiteScore 1.71
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.873 SNIP 1.144 CiteScore 1.78
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.243 SNIP 1.089 CiteScore 1.66
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.403 SNIP 1.352 CiteScore 2.4
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.453 SNIP 1.278
Web of Science (2010): Indexed yes
Silent Phase Qubit Tuning for Logic Operations

General information
State: Published
Organisations: Electric Power Engineering, Department of Electrical Engineering
Authors: Klenov, N. (Ekstern), Kornev, V. (Ekstern), Sosedko, D. (Ekstern), Pedersen, N. F. (Intern)
Publication date: 2007

Host publication information
Title of host publication: Conference proceedings: Int. Supercond. Electronics Conf.: ISEC '07
Main Research Area: Technical/natural sciences

Bibliographical note
P-P03
Source: orbit
Source-ID: 202616
Publication: Research › Article in proceedings – Annual report year: 2007

Vortices in the New Superconductors

General information
State: Published
Organisations: Department of Electrical Engineering, Electric Power Engineering, Department of Informatics and Mathematical Modeling
Authors: Madsen, S. P. (Intern), Pedersen, N. F. (Intern), Christiansen, P. L. (Intern), Tønnesen, O. (Intern)
Publication date: Apr 2006
Search for the in-phase Flux Flow mode in stacked Josephson junctions
Josephson vortex flux flow states in stacked Josephson junctions are investigated numerically. The aim of the work is to understand the mechanisms behind the formation of triangular (anti-phase) and square (in-phase) vortex lattices, and is motivated by recent experiments on layered BSCCO type high-T-c superconductors in a magnetic field. In order to keep the problem as simple as possible we consider in detail only the case with two junctions in the stack. (c) 2006 Elsevier B.V. All rights reserved.

General information
State: Published
Organisations: Electric Power Engineering, Department of Electrical Engineering
Authors: Pedersen, N. F. (Intern), Madsen, S. P. (Ekstern)
Pages: 262-266
Publication date: 2006
Main Research Area: Technical/natural sciences
Synchronisation of Josephson vortices in multi-junction systems

A largely adopted model for the description of high-temperature superconductors such as BSCCO results in several long Josephson junctions one on the top of the other ("stacked"). The dynamics of the basic nonlinear excitation of the isolated long Josephson junction, the Josephson vortex, is modified by the coupling among the junctions, so the motion of the flux quanta in the various layers is affected by the flux dynamics in all other layers. Two basic states are possible: a synchronous motion, where all junctions are reflected at the edge at the same instant, and an out-of-phase motion, where vortices in each layer are shifted with respect to neighboring vortices. This is of direct interest for applications since flux quanta emit, upon reflection, radiation at frequencies of great interest (above 100 GHz). Research has been directed towards the optimal conditions to favor such emission, that is mainly to retrieve the above described synchronous motion. We discuss the physics behind synchronization of nonlinear elements and we review applications to Josephson arrays. We discuss in the framework of a general model for synchronization, the Kuramoto model, a mechanism that can possibly enhance synchronization, such as coupling to a resonant cavity. We present a version of the Kuramoto model that might...
include the effects of the strong interaction between the oscillators and the cavity. (c) 2005 Elsevier B.V. All rights reserved.

General information
State: Published
Organisations: Electric Power Engineering, Department of Electrical Engineering
Authors: Filatrella, G. (Ekstern), Pedersen, N. F. (Intern), Wiesenfeld, K. (Ekstern)
Pages: 65-68
Publication date: 2006
Main Research Area: Technical/natural sciences

Publication information
Journal: Physica C: Superconductivity and its Applications
Volume: 437-438
ISSN (Print): 0921-4534
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.575 SNIP 0.924 CiteScore 1.14
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.446 SNIP 0.888 CiteScore 0.99
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.497 SNIP 0.83 CiteScore 0.85
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.439 SNIP 0.7 CiteScore 0.79
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.55 SNIP 0.621 CiteScore 0.79
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.652 SNIP 0.607 CiteScore 0.94
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.63 SNIP 0.631
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.412 SNIP 0.56
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.67 SNIP 0.576
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.532 SNIP 0.716
Scopus rating (2006): SJR 0.667 SNIP 0.556
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.793 SNIP 0.656
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.779 SNIP 0.644
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 0.598 SNIP 0.592
Web of Science (2003): Indexed yes
The energy level splitting for Unharmonic dc SQUID to be used as phase Q-bit

Dc-SQUID with Josephson junctions characterized by nonsinusoidal current-phase relation is being considered as a basis for phase qubit. It has been shown that the second and third harmonic components each in the current-phase relation are able to provide double-well potential and the energy level splitting. Threshold condition for the double-well form origin has been determined taking into account the impact of both harmonics. The splitting gap of the ground energy level has been calculated as a function of the harmonic amplitudes for different ratio s of characteristic Josephson energy E-C to the Coulomb energy E-Q0. It has been shown that the gap value comes to about 7E(Q0) with increase of the ratio s. No external field needed, no bias current required and no circular currents are major advantages of such a qubit. (c) 2006 Elsevier B.V. All rights reserved.
The Ginzburg-Landau Equation Solved by the Finite Element Method

Around 1950 V.L. Ginzburg and L.D. Landau proposed a phenomenological theory for phase transitions. The theory is based on a phenomenological Schrödinger equation with a $\phi^4$ potential and a kinetic term involving the momentum operator. One of the more successful applications of the theory is to superconductivity and in particular to superconductors placed in a magnetic field. Superconductors expel magnetic fields from the inside bulk by setting up screening currents in the surface (type I superconductors). However, some superconductors allow for magnetic field penetration through quantized current vortices when the magnetic field exceeds a threshold value. These superconductors are called type II superconductors. In this article we solve numerically the time dependent Ginzburg-Landau equation coupled to a magnetic field for type II superconductors of complex geometry, where the finite element method is particularly suited.
The Unharmonic dc SQUID Energy Level Splitting.

General information
State: Published
Organisations: Electric Power Engineering, Department of Electrical Engineering
Authors: Klenov, N. V. (Ekstern), Kornev, V. K. (Ekstern), Pedersen, N. F. (Intern)
Pages: 1409-1412
Publication date: 2006
Conference: EUCAS-05 conference., Vienna, Austria. 11-15 Sept., 01/01/2006
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Physics
Volume: 43
Original language: English
Source: orbit
Source-ID: 190710
Publication: Research - peer-review › Conference article – Annual report year: 2006

Bandwidth and noise of submm wave detector on cuprate Josephson bicrystal junctions

General information
State: Published
Organisations: Department of Electrical Engineering
Authors: Ovsyannikov, G. A. (Ekstern), Borisenko, I. V. (Ekstern), Constantinian, K. Y. (Ekstern), Kisilinski, Y. V. (Ekstern), Hakhoumian, A. A. (Ekstern), Pogosyan, N. G. (Ekstern), Zakaryan, T. (Ekstern), Pedersen, N. F. (Intern), Mygind, J. (Ekstern), Uzunoglu, N. (Ekstern), Karagianni, E. (Ekstern)
Pages: 533-536
Publication date: 2005
Main Research Area: Technical/natural sciences

Publication information
Journal: IEEE Transactions on Applied Superconductivity
Issue number: 15
ISSN (Print): 1051-8223
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.42 SJR 0.395 SNIP 1.031
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.35 SNIP 0.935 CiteScore 1.27
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.47 SNIP 1.113 CiteScore 0.83
Web of Science (2014): Indexed yes
Domain Walls and Textured Vortices in a Two-Component Ginzburg-Landau Model

We look for domain wall and textured vortex solutions in a two-component Ginzburg-Landau model inspired by two-band superconductivity. The two-dimensional two-component model, with equal coherence lengths and no magnetic field, shows some interesting properties. In the absence of a Josephson type coupling between the two order parameters a "textured vortex" is found by analytical and numerical solution of the Ginzburg-Landau equations. With a Josephson type coupling between the two order parameters we find the system to split up in two domains separated by a domain wall, where the order parameter is depressed to zero.

General information
State: Published
Organisations: Department of Electrical Engineering, Department of Informatics and Mathematical Modeling, Electric Power Engineering, Centre for Electric Technology
Authors: Madsen, S. P. (Intern), Gaididei, Y. B. (Ekstern), Christiansen, P. L. (Intern), Pedersen, N. F. (Intern)
Pages: 432-440
Publication date: 2005
Main Research Area: Technical/natural sciences

Publication information
Journal: Physics Letters A
Volume: 344
Issue number: 6
Long Josephson Junctions

General information
State: Published
Organisations: Department of Electrical Engineering
Authors: Pedersen, N. F. (Intern), Scott, A. (Ed.) (Extern)
Pages: 537-538
Publication date: 2005

Host publication information
Title of host publication: Encyclopedia of Nonlinear science
Place of publication: New York, London
Publisher: Routledge, Taylor and Francis Group
ISBN (Print): 1579583857
Main Research Area: Technical/natural sciences
Links:
Source: orbit
Source-ID: 180902
Publication: Research - peer-review › Book chapter – Annual report year: 2005

Microwave oscillator based on an intrinsic BSCCO-type Josephson junction
The electrical behavior of anisotropic BSCCO single crystals is modeled by mutually coupled long Josephson junctions. For the basic fluxon modes with one fluxon per layer, the fluxons will arrange themselves in an anti-phase configuration (triangular lattice) because of the mutual repulsion. We are interested in the in-phase modes (square lattice) desired for many potential applications. We consider two mechanisms (i) intrinsic locking by out of phase oscillations at the trailing edge and (ii) locking by an external high-Q resonator with a resonance frequency corresponding to the fluxon in-phase motion. The resulting model is a set of coupled nonlinear partial differential equations. By direct numerical simulations we have demonstrated that the qualitative behavior of the combined intrinsic Josephson junction and cavity system can be understood on the basis of general concepts of nonlinear oscillators interacting with a resonator. For some region of the parameter space it is possible to reach the desired synchronous state, making the system potentially suitable for applications. We also consider the system in the flux flow mode under a high magnetic field.

General information
State: Published
Organisations: Department of Electrical Engineering
Authors: Pedersen, N. F. (Intern), Madsen, S. P. (Intern)
Pages: 948-951
Publication date: 2005

Publication information
Journal: IEEE Transactions on Applied Superconductivity
Issue number: 2
ISSN (Print): 1051-8223
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.42 SJR 0.395 SNIP 1.031
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.35 SNIP 0.935 CiteScore 1.27
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Numerical simulations of flux flow in stacked Josephson junctions

We numerically investigate Josephson vortex flux flow states in stacked Josephson junctions, motivated by recent experiments trying to observe the vortices in a square vortex lattice when a magnetic field is applied to layered high-Tc superconductors of the Bi2Sr2CaCu2Ox type. By extensive numerical simulations, we are able to clearly distinguish between triangular and square vortex lattices and to identify the parameters leading to an in-phase vortex configuration.

General information
State: Published
Organisations: Electric Power Engineering, Department of Electrical Engineering, Electric Components
Origin of flux-flow resistance oscillations in Bi2Sr2CaCu2O8+y: Possibility of Fiske steps in a single junction

We propose an alternative explanation to the oscillations of the flux-flow resistance found in several previously published experiments with Bi2Sr2CaCu2O8+y stacks. It has been argued by the previous authors that the period of the oscillations corresponding to the field needed to add one vortex per two intrinsic Josephson junctions is associated with a moving triangular lattice of vortices (out-of-phase mode), while the period corresponding to one vortex per one junction is due to the square lattice (in-phase mode). In contrast, we show that both type of oscillations may occur in a single-layer Josephson junction and thus the above interpretation is inconsistent.
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 3.382 SNIP 1.438 CiteScore 3.61
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 3.417 SNIP 1.451
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 3.109 SNIP 1.474
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 2.982 SNIP 1.524
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 2.923 SNIP 1.546
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 2.796 SNIP 1.56
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 2.763 SNIP 1.607
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 2.742 SNIP 1.606
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 2.75 SNIP 1.536
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 2.788 SNIP 1.706
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 2.946 SNIP 1.635
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 2.986 SNIP 1.631
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 3.115 SNIP 1.58
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Source-ID: 181916
Publication: Research - peer-review › Journal article – Annual report year: 2005

Superconductivity

General information
State: Published
Organisations: Department of Electrical Engineering
Authors: Pedersen, N. F. (Intern), Scott, A. (ed.) (Ekstern)
Publication date: 2005

Host publication information
Title of host publication: Encyclopedia of Nonlinear science
Place of publication: New York, London
Publisher: Routledge, Taylor and Francis Group
ISBN (Print): 1579583857
Main Research Area: Technical/natural sciences
Dc SQUID behaviour resulting from no sinusoidal current-phase relation of bicrystal junctions

General information
State: Published
Organisations: Electric Power Engineering, Department of Electrical Engineering
Authors: Kornev, V. (Ekstern), Klenov, N. (Ekstern), Borisenkov, I. (Ekstern), Ovsyannikov, G. (Ekstern), Pedersen, N. F. (Intern)
Pages: 3189-3189
Publication date: 2004

Host publication information
Title of host publication: IOP conf.
Volume: 181
Place of publication: Bristol and Philadelphia
Publisher: IOP Publishing Ltd
ISBN (Print): 0-7503-09814
Main Research Area: Technical/natural sciences

Fluxon dynamics in BSCCO – Microwave emission
We consider a system of stacked Josephson junctions and investigate the different fluxon modes. Some of these modes can be used to construct an oscillator with a frequency in the range 200 GHz-1 THz. We discuss the output that can be expected from the different fluxon modes, and we calculate the theoretical maximum output numerically.

General information
State: Published
Organisations: Department of Electrical Engineering
Authors: Pedersen, N. F. (Intern), Madsen, S. P. (Intern)
Pages: 117-121
Publication date: 2004
Main Research Area: Technical/natural sciences
Fluxon modes and Microwave emission in BSCCO type Josephson stacks

General information
State: Published
Organisations: Department of Electrical Engineering, Electric Power Engineering
Authors: Pedersen, N. F. (Intern), Madsen, S. P. (Intern)
Pages: 253-259
Publication date: 2004

Host publication information
Title of host publication: Proceedings of the EUCAS 2003 conference
Publisher: IOP Publishing Ltd
Main Research Area: Technical/natural sciences
Fluxon modes in stacked Josephson junctions: The role of linear modes

Plasma modes in stacked Josephson junctions are easily understood analytically from a linearization of the coupled sine-Gordon equation describing the system. We demonstrate here by numerical methods that the analytically derived symmetries of the plasma modes are carried over to the fluxon modes. Using this fact we are, with a few exceptions, able to predict and construct a full family of Josephson fluxon modes without using numerical methods. The nature of the locking mechanism needed to create the technologically important in-phase fluxon modes is discussed.

General information
State: Published
Organisations: Department of Electrical Engineering, Electric Components
Authors: Madsen, S. P. (Intern), Pedersen, N. F. (Intern)
Pages: 064507
Publication date: 2004
Main Research Area: Technical/natural sciences

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Volume: 69
Issue number: 6
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Ratings:
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.16
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.933 SNIP 0.94 CiteScore 2.8
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.667 SNIP 1.262 CiteScore 3.3
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.785 SNIP 1.339 CiteScore 3.55
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 3.206 SNIP 1.394 CiteScore 3.57
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 3.382 SNIP 1.438 CiteScore 3.61
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 3.417 SNIP 1.451
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 3.109 SNIP 1.474
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 2.982 SNIP 1.524
Fluxon modes in superconducting multilayers

**General information**
State: Published  
Organisations: Electric Power Engineering, Department of Electrical Engineering  
Authors: Pedersen, N. F. (Intern), Madsen, S. P. (Intern)  
Publication date: 2004

**Host publication information**
Title of host publication: IOP, conference proceedings 181  
Publisher: IOP Publishing Ltd  
ISBN (Print): 0-7503-09814  
Main Research Area: Technical/natural sciences  
Links:  
Source: orbit  
Source-ID: 188925  
Publication: Research - peer-review › Article in proceedings – Annual report year: 2004

Fluxon modes in superconducting multilayers

**General information**
State: Published  
Organisations: Department of Electrical Engineering
Interaction between a BSCCO-type intrinsic Josephson junction and a microwave cavity

General information
State: Published
Organisations: Department of Electrical Engineering
Authors: Madsen, S. P. (Intern), Filatrella, G. (Ekstern), Pedersen, N. F. (Intern)
Pages: 209-215
Publication date: 2004
Main Research Area: Technical/natural sciences

Publication information
Journal: The European Physical Journal B
Volume: 40
Issue number: 2
ISSN (Print): 1434-6028
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.11 SJR 0.452 SNIP 0.654
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.53 SNIP 0.744 CiteScore 1.13
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.657 SNIP 0.717 CiteScore 1.25
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.727 SNIP 0.805 CiteScore 1.42
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.851 SNIP 0.886 CiteScore 1.51
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.027 SNIP 0.924 CiteScore 1.6
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.087 SNIP 0.871
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.973 SNIP 0.815
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.099 SNIP 0.837
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.158 SNIP 0.933
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.146 SNIP 0.933
Numerical simulations on intrinsic Josephson junctions: Building a microwave oscillator

General information
State: Published
Organisations: Electric Power Engineering, Department of Electrical Engineering
Authors: Pedersen, N. F. (Intern), Madsen, S. P. (Intern)
Publication date: 2004

Host publication information
Title of host publication: Proceedings of the "Plasma 2004" conference
Main Research Area: Technical/natural sciences
Conference: Plasma 2004, Tsukuba, Japan, 05/11/1829
Source: orbit
Source-ID: 188989
Publication: Research › Article in proceedings – Annual report year: 2004

Synchronization of intrinsic Josephson junctions to a cavity
In the utilization of intrinsic Josephson junctions of the highly anisotropic BSCCO type for microwave generation the in-phase motion of fluxons in the different layers is highly desirable but difficult to obtain. We propose to couple each stack junction-which constitutes an underdamped fluxon oscillator-to an external high-Q resonator. We have numerically investigated the possibility for in-phase fluxon synchronization using the external cavity.

General information
State: Published
Organisations: Department of Electrical Engineering
Authors: Filatrella, G. (Ekstern), Pedersen, N. F. (Intern)
Pages: 560-561
Publication date: 2004
Main Research Area: Technical/natural sciences

Publication information
Journal: Physica C - Superconductivity and its Applications
Volume: 408-410
Issue number: 1
ISSN (Print): 0921-4534
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.575 SNIP 0.924 CiteScore 1.14
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.446 SNIP 0.888 CiteScore 0.99
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.497 SNIP 0.83 CiteScore 0.85
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.439 SNIP 0.7 CiteScore 0.79
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.55 SNIP 0.621 CiteScore 0.79
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.652 SNIP 0.607 CiteScore 0.94
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.63 SNIP 0.631
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.412 SNIP 0.56
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.67 SNIP 0.576
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.532 SNIP 0.716
Scopus rating (2006): SJR 0.667 SNIP 0.556
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.793 SNIP 0.656
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.779 SNIP 0.644
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 0.598 SNIP 0.592
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 0.648 SNIP 0.529
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 0.626 SNIP 0.643
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 0.985 SNIP 0.888
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 0.966 SNIP 0.705
Original language: English
fluxon, phase-lock, Intrinsic Josephson junctions
Links:
Source: orbit
Source-ID: 180846
Publication: Research - peer-review › Journal article – Annual report year: 2004
Vortex dynamics in Josephson ladders with II-junctions
Both experimental and numerical studies of a self-frustrated triangular array of pi-junctions are reported. The array of SFS Josephson junctions shows a transition to the pi-state and self-frustration with a decrease in temperature. This manifests itself in a half-period shift of the bias critical current versus applied magnetic field. At temperatures close to the 0-pi transition this dependence shows a doubling of its periodicity frequency that can be explained by 0-pi bistability of the SFS junctions. The change in the array behaviour with number of unit cells has been studied by means of numerical simulation.
Vortex dynamics in Josephson ladders with $\pi$-junctions

**General information**

State: Published
Organisations: Electric Power Engineering, Department of Electrical Engineering
Authors: Kornev, V. K. (Ekstern), Klenov, N. V. (Ekstern), Oboznov, V. (Ekstern), Faofanov, A. (Ekstern), Bol'ginov, V. (Ekstern), Ryazanov, V. (Ekstern), Pedersen, N. F. (Intern)
Pages: 3553-3558
Publication date: 2004

**Host publication information**

Title of host publication: IOP conference proceedings # 181.
Publisher: Institute of Physics
ISBN (Print): 0-7503-09814
Main Research Area: Technical/natural sciences
Source-ID: 188768
Publication: Research - peer-review › Article in proceedings – Annual report year: 2004

Vortices in Two-Component Ginzburg-Landau Theory

**General information**

State: Published
Organisations: Department of Electrical Engineering, Department of Informatics and Mathematical Modeling, Electric Power Engineering
Authors: Madsen, S. P. (Intern), Gaididei, Y. B. (Ekstern), Christiansen, P. L. (Intern), Pedersen, N. F. (Intern)
Pages: 128-130
Publication date: 2004

**Host publication information**

Title of host publication: Proceedings of FIMS/ITS-NS/CTC/PLASMA 2004
Volume: 2
Main Research Area: Technical/natural sciences
Conference: FIMS/ITS-NS/CTC/PLASMA 2004 : 24-28 November, Tsukuba, Japan, 01/01/2004
Source-ID: 200545
Publication: Research - peer-review › Conference abstract in proceedings – Annual report year: 2004
Cavity synchronisation of underdamped Josephson junction arrays

Our recent experiments show that arrays of underdamped Josephson junctions radiate coherently only above a threshold number of junctions switched onto the radiating state. For each junction, the radiating state is a resonant step in the current-voltage characteristics due to the interaction between the junctions in the array and an electromagnetic cavity. Here we show that a model of a one-dimensional array of Josephson junctions coupled to a resonator can produce many features of the coherent behavior above threshold, including coherent radiation of power and the shape of the array current-voltage characteristic. The model also makes quantitative predictions about the degree of coherence of the junctions in the array. However, in this model there is no threshold; the experimental below-threshold region behavior could not be reproduced.

General information
State: Published
Organisations: Department of Electrical Engineering
Authors: Barbara, P. (Ekstern), Filatrella, G. (Ekstern), Lobb, C. (Ekstern), Pedersen, N. F. (Intern)
Pages: 3-8
Publication date: 2003
Main Research Area: Technical/natural sciences

Publication information
Journal: The European Physical Journal B
Volume: 34
Issue number: 1
ISSN (Print): 1434-6028
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.11 SJR 0.452 SNIP 0.654
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.53 SNIP 0.744 CiteScore 1.13
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.657 SNIP 0.717 CiteScore 1.25
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.727 SNIP 0.805 CiteScore 1.42
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.851 SNIP 0.886 CiteScore 1.51
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.027 SNIP 0.924 CiteScore 1.6
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.087 SNIP 0.871
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.973 SNIP 0.815
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.099 SNIP 0.837
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.158 SNIP 0.933
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.146 SNIP 0.933
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.305 SNIP 0.958
Web of Science (2005): Indexed yes
Fluxons and their interactions in a system of three stacked Josephson junctions

Fluxon dynamics in a system of three coupled driven damped sine-Gordon equations is investigated. Bunching of fluxons is observed. It is shown that fluxon-fluxon-fluxon bound states exist in a certain interval of the fluxon velocity. Attraction between fluxons occurs as a result of indirect fluxon-fluxon interaction mediated by Swihart waves. To tackle the problem analytically a piece-wise linear approach is developed. The analytical approximations show good agreement with the results obtained by direct numerical simulations.

General information
State: Published
Organisations: Department of Informatics and Mathematical Modeling, Department of Mathematics, Electric Components, Department of Electrical Engineering, University of the Basque Country
Authors: Corria, C. (Ekstern), Christiansen, P. L. (Intern), Gaididei, Y. B. (Intern), Muto, V. (Ekstern), Pedersen, N. F. (Intern), Sørensen, M. P. (Intern)
Pages: 035415
Publication date: 2003
Main Research Area: Technical/natural sciences

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Volume: 68
Issue number: 3
ISSN (Print): 1098-0121
Ratings:
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.16
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.933 SNIP 0.94 CiteScore 2.8
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.667 SNIP 1.262 CiteScore 3.3
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.785 SNIP 1.339 CiteScore 3.55
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 3.206 SNIP 1.394 CiteScore 3.57
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 3.382 SNIP 1.438 CiteScore 3.61
Shot noise in YBCO bicrystal Josephson junctions

We measured spectral noise density in YBCO symmetric bicrystal Josephson junctions on sapphire substrates at bias voltages up to 100 mV and T = 4.2 K. Normal state resistance of the Josephson junctions, R_N = 20-90 Ω and ICRN up to 2.2 mV have been observed in the experimental samples. Noise measurements were carried out within frequency bands of 1-2 GHz and 0.3-300 kHz. At bias voltages 10 less than or equal to V less than or equal to 60 mV a linear voltage dependence of noise power has been registered, while at V less than or equal to 5 mV a noticeable noise rise has been observed. The latter may explain the experimentally measured linewidth broadening of Josephson oscillations at mm and submm wave frequencies in high-Tc superconducting junctions. Experimental results are discussed in terms of bound states existing at surfaces of d-wave superconducting electrodes.

General information
State: Published
Organisations: Department of Physics, Electric Power Engineering, Department of Electrical Engineering
Authors: Constantinian, K. (Ekstern), Ovsyannikov, G. (Ekstern), Borisenko, I. (Ekstern), Mygind, J. (Intern), Pedersen, N. F. (Intern)
Pages: 610-613
Publication date: 2003
Main Research Area: Technical/natural sciences

Publication information
Journal: IEEE Transactions on Applied Superconductivity
Volume: 13
Issue number: 2
ISSN (Print): 1051-8223
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.42 SJR 0.395 SNIP 1.031
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.35 SNIP 0.935 CiteScore 1.27
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.47 SNIP 1.113 CiteScore 0.83
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.431 SNIP 1.171 CiteScore 1.32
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.575 SNIP 1.27 CiteScore 1.11
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.364 SNIP 1.063 CiteScore 1.16
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
The 0 and π contact array model of bicrystal junctions and interferometers

The array model of the faceted bicrystal Josephson junctions has been developed more comprehensively. The facet size and the facet critical current dependence on magnetic field are taken into consideration. The model can be successfully used with high-performance software meant for numerical simulation of the lumped Josephson junction circuits, e.g., PSCAN, WinS. The based on the model results for critical current dependence on applied magnetic field are compared with experimental data for the bicrystal junctions fabricated by dc sputtering at high pressure. Impact of no sinusoidal Josephson current-phase relation on the dc interferometer critical current as a function of magnetic field is analyzed as well.

General information
State: Published
Organisations: Department of Electrical Engineering
Authors: Kornev, V. K. (Ekstern), Soloviev, I. I. (Ekstern), Klenov, N. V. (Ekstern), Pedersen, N. F. (Intern), Borisenko, I. V. (Ekstern), Mozhaev, P. B. (Ekstern), Ovsyannikov, G. A. (Ekstern)
Pages: 825-828
Publication date: 2003
Main Research Area: Technical/natural sciences

Publication information
Journal: IEEE Transactions on applied superconductivity
Volume: 13
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ISSN (Print): 1051-8223
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.42 SJR 0.395 SNIP 1.031
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.35 SNIP 0.935 CiteScore 1.27
Web of Science (2015): Indexed yes
Bicrystal pi-interferometers

General information
State: Published
Organisations: Electric Power Engineering, Department of Electrical Engineering
Authors: Kornev, V. (Ekstern), Ovsyannikov, G. (Ekstern), Mozhaev, P. (Ekstern), Brisenko, I. (Ekstern), Pedersen, N. F. (Intern)
Pages: 332-336
Publication date: 2002
Main Research Area: Technical/natural sciences

Publication information
Journal: Physica C: Superconductivity and its Applications
Volume: 368
Issue number: 1-4
Dynamics of pi-junction interferometer circuits
The pi-junction superconducting circuit dynamics was studied by means of numerical simulation technique. Parallel arrays consisting of Josephson junctions of both 0- and pi-type were studied as a model of high-T-c grain-boundary Josephson junction. The array dynamics and the critical current dependence on magnetic field are discussed. Experimental results for dc interferometers with 0 and pi high-T-c bi-crystal Josephson junctions are reported and discussed in comparison with numerical simulation.
Fluxon dynamics in three stacked Josephson junctions
The motion of fluxons of the same polarity in three vertically stacked Josephson junctions is studied. In this configuration the difference between exterior and interior junctions plays a more important role than in other configurations with several interior junctions. Below the Swihart velocity $c/sub -$/, the coupling between junctions leads to a repulsion of the fluxons with the same polarity. Above this critical velocity a fluxon will induce radiation in the neighboring junctions, leading to a bunching of the fluxons in the stacked junctions. Using the Sakai-Bodin-Pedersen model, three coupled perturbed sine-Gordon equations are numerically studied for different values of coupling, damping, and bias parameters. In a narrow range of velocities bunching occurs. Outside this interval the fluxons split and new fluxons may be created. I-V characteristics are presented.
Linear and nonlinear flux dynamics in multilayered Bi2Sr2CaCu2Ox single crystals

For an anisotropic, multilayered superconductor of the BSCCO type or a low Tc Josephson stack, the linear plasma resonances are derived theoretically using the inductive coupling model. The eigenmodes of these plasma oscillations are discussed. It is shown that symmetries from the plasma dispersion relation and the dynamic properties of the vortices are closely connected and we predict from this analysis the vortex excitations that are otherwise only obtainable from numerical simulations. The model assumes that vortices and an applied magnetic field are parallel to the planes.
Low voltage excess noise and shot noise in YBCO bicrystal junctions

The spectral density of background noise emitted by symmetric bicrystal YBaCuO Josephson junctions on sapphire substrates have been measured by a low noise cooled HEMT amplifier for bias voltages up to V approximate to 50 mV. At relatively low voltages V <4 mV a noticeable noise rise has been registered. At large bias voltages V > 30 mV a clear dependence of noise power, exactly coinciding to the asymptote of the Schottky shot noise function, has been observed for the first time. Experimental results are discussed in terms of multiple Andreev reflections which may take place in d-wave superconducting junctions with low transparency D much less than 1.

General information

State: Published
Organisations: Department of Physics
Authors: Constantinian, K. (Ekstern), Ovsyannikov, G. (Ekstern), Borisenko, I. (Ekstern), Mygind, J. (Intern), Pedersen, N. F. (Intern)
Pages: 276-279
Publication date: 2002
Main Research Area: Technical/natural sciences

Publication information

Journal: Physica C: Superconductivity and its Applications
Volume: 367
Issue number: 1-4
ISSN (Print): 0921-4534
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.575 SNIP 0.924 CiteScore 1.14
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.446 SNIP 0.888 CiteScore 0.99
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.497 SNIP 0.83 CiteScore 0.85
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.439 SNIP 0.7 CiteScore 0.79
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.55 SNIP 0.621 CiteScore 0.79
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.652 SNIP 0.607 CiteScore 0.94
The mechanism of synchronization of Josephson arrays coupled to a cavity
Josephson junctions arrays can synchronize to achieve interesting levels of narrow line width radiation in the microwave region. We have numerically investigated the mechanism that leads to such a synchronous state for disordered arrays strongly coupled to a high-Q resonator. We have found that the array undergoes a sharp transition from a state where the junctions are essentially oscillating at the unperturbed frequencies to one where they oscillate at the same frequency. The transition occurs above a threshold number of active junctions, in agreement with previous experimental and theoretical results.
Experimental study of noise and Josephson oscillation linewidths in bicrystal YBCO junctions

The intensities of the noise in a bicrystal high-T-c (HTS) Josephson junction have been precision-measured at 1-2 GHz frequency band at bias voltages up to 50 mV at T = 4.2 K. At large bias voltages, V > 30 mV, the dependence of current noise density was found exactly coinciding with the Schottky shot noise asymptote 2eI. At relatively low voltages, V < 4 mV, a noticeable noise rise has been registered. The broadening of Josephson oscillation linewidths $f_J$ over the values $\Delta f(RSJ)$ predicted by the RSJ model has been experimentally studied at different frequencies in the mm and submm wave range up to voltages $V = 2$ mV in connection with low-voltage noise rise. Both the features observed, the linewidth broadening and the excess noise over the noise level of thermal fluctuations, are discussed in terms of multiple Andreev reflection, giving rise to a nonequilibrium shot noise—the case which may take place in the d-wave superconducting junctions. Experimental results on noise performance are also compared with the qualitatively similar dependences of the current noise, known for the s-superconducting ballistic point-like or diffusive-type SNS junctions, where the excess low-voltage noise is manifested due to multiple Andreev reflections. Increasing the operating temperature, the thermal (equilibrium) fluctuations were found to predominate, resulting in a decrease of ratio $\Delta f(J)/\Delta f(RSJ)$. The characteristics of the ac Josephson effect in FITS junctions measured at submm. wave frequencies at temperatures close to the transition temperature T-c are also discussed.
Selected problems in power applications of high Tc superconductors

Two important problems connected with power applications of BSCCO tapes are discussed: (i) the problem of developing prototypes when the tape properties are changing, and (ii) the problem of flux pinning in intrinsic BSCCO. An overview of the different projects on superconducting power cables is given. (C) 2001 Elsevier Science B.V. All rights reserved.

General information
State: Published
Organisations: Electric Power Engineering, Department of Electrical Engineering
Authors: Tønnesen, O. (Intern), Pedersen, N. F. (Intern)
Pages: 55-59
Publication date: 2001
Main Research Area: Technical/natural sciences

Publication information
Journal: Physica C: Superconductivity and its Applications
Volume: 354
Issue number: 1-4
ISSN (Print): 0921-4534
Ratings:
Two-dimensional Josephson junction arrays coupled through a high-Q cavity

The problem of disordered two-dimensional arrays of underdamped Josephson junctions is addressed. Our simulations show that when coupled to a high-Q cavity, the array exhibits synchronized behavior, and the power emitted can be considerably increased once enough junctions are activated to pump the cavity. The highly resonant cavity induces synchronized behavior, which is qualitatively different than what is familiar from other studies on nonlinear oscillator arrays, for example the Kuramoto model. We also address the effects of disorder, as well as the role of detuning between the spontaneous emission frequency of the junctions and the cavity resonant frequency. We show with a simple argument that we can predict the scaling behavior of disorder with the size of the array. The consequences for the design of microwave oscillators in the Gigahertz region are discussed.
Efficient multi-josephson junction oscillator using a cavity

General information
State: Published
Organisations: Department of Electric Power Engineering, University of Salerno, Georgia Institute of Technology
Authors: Filatrella, G. (Ekstern), Pedersen, N. F. (Intern), Wiesenfeld, K. (Ekstern)
Number of pages: 167
Publication date: 2000

Host publication information
Title of host publication: Proc. EUCAS99 conference. IOP conf. Series No 167
Publisher: IOP Publishing Ltd
Main Research Area: Technical/natural sciences
Conference: EUCAS99, Barcelona, 01/01/1999
Source: orbit
Source-ID: 172830
Publication: Research - peer-review › Article in proceedings – Annual report year: 2000

High-Q cavity-induced synchronization in oscillator arrays
A model for a large number of Josephson junctions coupled to a cavity is presented. The system displays synchronization behavior very similar to that reported in recent experiments [P. Barbara ct al., Phys. Rev. Lett. 82, 1963 (1999)]. The essential dynamical mechanism responsible for coherence should be generic in nonlinear oscillator systems where the interactions are mediated by a highly resonant cavity, in analogy with gas lasers.

General information
State: Published
Organisations: Electric Components, Department of Electrical Engineering, University of Salerno, Georgia Institute of Technology
Authors: Filatrella, G. (Ekstern), Pedersen, N. F. (Intern), Wiesenfeld, K. (Ekstern)
Pages: 2513-18
Publication date: 2000
Main Research Area: Technical/natural sciences

Publication information
Volume: 61
Issue number: 3
ISSN (Print): 1063-651X
Ratings:
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.95 SJR 0.993 SNIP 0.896
Web of Science (2016): Indexed yes
MM wave Josephson radiation in high Tc bicrystal junction arrays

General information
State: Published
Organisations: Department of Electric Power Engineering
Authors: Constantinian, K. Y. (Ekstern), Mashtakov, A. D. (Ekstern), Ovsyannikov, G. A. (Ekstern), Kornev, V. K. (Ekstern), Arzumanov, A. V. (Ekstern), Sherbakov, N. A. (Ekstern), Darula, M. (Ekstern), Mygind, J. (Ekstern), Pedersen, N. F. (Intern)
Number of pages: 717
Publication date: 2000

Plasma resonance and flux dynamics in layered high-Tc superconductors

Flux dynamics of layered high Tc superconductors are considered with special emphasis on the small oscillation modes. In particular we find the dispersion relation for the plasma modes and discuss the spectra to be observed in microwave experiments.

General information
State: Published
Organisations: Department of Electric Power Engineering
Authors: Pedersen, N. F. (Intern), Sakai, S. (Ekstern)
Pages: 297-301
Publication date: 2000
Main Research Area: Technical/natural sciences
Prediction of half harmonic generation in stacked Josephson junctions and Bi$_2$Sr$_2$CaCu$_2$O$_x$ single crystals

We demonstrate analytically that parametric excitation of certain plasma resonance modes in Bi$_2$Sr$_2$CaCu$_2$O$_x$ single crystals is possible. The model we use is that of a Josephson stack, and the fundamental mechanism is that of half harmonic generation in time and space when a threshold of the applied rf signal is exceeded. The phenomenon is important as a diagnostic tool for the investigation of plasma resonance in Bi$_2$Sr$_2$CaCu$_2$O$_x$-like materials, as well as being a basis for making high-T-c high-frequency parametric amplifiers. It has same unique features of space and time nonlinear behavior.

General information
State: Published
Organisations: Electric Components, Department of Electrical Engineering, Electrotechincal Laboratory
Authors: Pedersen, N. F. (Intern), Sakai, S. (Ekstern)
Pages: 11328-11331
Publication date: 2000
Main Research Area: Technical/natural sciences

Publication information
Volume: 61
Stacked Josephson junctions

General information
State: Published
Organisations: Department of Electric Power Engineering
Authors: Pedersen, N. F. (Intern)
Pages: 121-135
Publication date: 2000

Host publication information
Title of host publication: Nonlinear Science at the Dawn of the 21th Century (Eds. Christiansen, P. L., Soerensen, M. P. and Scott, A. C.
Place of publication: Berlin
Publisher: Springer Verlag
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 177638
Publication: Research - peer-review › Article in proceedings – Annual report year: 2000

Interaction induced by nonuniform self-fields in stacks of two long Josephson junctions

General information
State: Published
Organisations: Department of Physics
Authors: Carapella, G. (Ekstern), Costabile, G. (Ekstern), Pedersen, N. F. (Intern), Sakai, S. (Ekstern)
Pages: 3953-3956
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Journal: IEEE Transactions on Applied Superconductivity
Volume: 9
Issue number: 2
ISSN (Print): 1051-8223
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.42 SJR 0.395 SNIP 1.031
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.35 SNIP 0.935 CiteScore 1.27
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.47 SNIP 1.113 CiteScore 0.83
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Josephson plasma resonance in superconducting multilayers

We derive an analytical solution for the Josephson plasma resonance of superconducting multilayers. This analytical solution is derived mainly for low T-c systems with magnetic coupling between the superconducting layers, but many features of our results are more general, and thus an application to the recently derived plasma resonance phenomena for high T-c superconductors of the BSCCO type is discussed.

General information
State: Published
Organisations: Department of Electric Power Engineering
Authors: Pedersen, N. F. (Intern)
Pages: 249-251
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Journal: I E T E Journal of Research
Volume: 45
Issue number: 3-4
ISSN (Print): 0377-2063
Ratings:
BFI (2018): BFI-level 1
Microwave radiation from Zero field singularities in stacks of two long Josephson junctions

General information
State: Published
Organisations: Department of Physics, University of Salerno
Authors: Carapella, G. (Ekstern), Costabile, G. (Ekstern), Mygind, J. (Intern), Pedersen, N. F. (Intern)
Pages: 4558-4562
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Journal: I E E E Transactions on Applied Superconductivity
Volume: 9
ISSN (Print): 1051-8223
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Millimeter and submillimeter wavelength Josephson flux flow devices

General information
State: Published
Organisations: Department of Physics
Authors: Mygind, J. (Intern), Pedersen, N. F. (Intern)
Publication date: 1999

Publication information
Publisher: Plenum
Original language: English
Millimeter and sub-mm wavelength Josephson Flux Flow Devices

General information
State: Published
Organisations: Department of Physics
Authors: Mygind, J. (Intern), Pedersen, N. F. (Intern)
Publication date: 1999

Host publication information
Title of host publication: NATO ASI
Place of publication: Miliau
Publisher: Springer
Editor: Weinstock, H.
Main Research Area: Technical/natural sciences
Conference: NATO Advanced Study Institute on Microwave Superconductivity, Miliau, France, 29/08/1999 - 29/08/1999
Source: orbit
Source-ID: 174027
Publication: Research - peer-review › Article in proceedings – Annual report year: 1999

MM wave Josephson generation in High-Tc bicrystal junction arrays

General information
State: Published
Organisations: Department of Physics
Authors: Constantinian, K. (Ekstern), Mashtakov, A. (Ekstern), Ovsyannikov, G. (Ekstern), Kornev, V. (Ekstern), N.A., S. (Ekstern), Darula, M. (Ekstern), Mygind, J. (Intern), Pedersen, N. F. (Intern)
Publication date: 1999

Host publication information
Title of host publication: Proceedings of the European Conference on Applied Superconductivity EUCAS 99
Place of publication: Barcelona
Publisher: IOP Publishing Ltd
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 174026
Publication: Research - peer-review › Article in proceedings – Annual report year: 1999

Noise in Bicrystal YBCO Josephson Junctions

General information
State: Published
Organisations: Department of Physics
Authors: Constantinian, K. (Ekstern), Ovsyannikov, G. (Ekstern), Mashtakov, A. (Ekstern), Mygind, J. (Intern), Pedersen, N. F. (Intern)
Publication date: 1999

Host publication information
Title of host publication: Proceedings of MOS 99 Stockholm 1999
Place of publication: Stockholm
Main Research Area: Technical/natural sciences
Conference: International Conference on Physics and Chemistry of Molecular and Oxide Superconductors (MOS-99), Stockholm, Sweden, 28/07/1999 - 28/07/1999
Source: orbit
Source-ID: 174023
Publication: Research - peer-review › Article in proceedings – Annual report year: 1999
Nonlinear science at the dawn of the 21th century: Stacked Josephson junctions

General information
State: Published
Organisations: Department of Electric Power Engineering
Authors: Pedersen, N. F. (Intern)
Publication date: 1999

Host publication information
Title of host publication: Nonlinear science at the dawn of the 21 th century
Place of publication: Berlin
Publisher: Springer
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 172208
Publication: Research - peer-review › Book chapter – Annual report year: 1999

Phase-locking of Josephson junction arrays achieved by an untraditional bias scheme

General information
State: Published
Organisations: Department of Physics
Authors: Filatrella, G. (Ekstern), Pedersen, N. F. (Intern), Wiesenfeld, K. (Ekstern)
Pages: 4546-4549
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Journal: IEEE Transactions on Applied Superconductivity
Volume: 9
Issue number: 2
ISSN (Print): 1051-8223
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.42 SJR 0.395 SNIP 1.031
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.35 SNIP 0.935 CiteScore 1.27
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.47 SNIP 1.113 CiteScore 0.83
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.431 SNIP 1.171 CiteScore 1.32
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.575 SNIP 1.27 CiteScore 1.11
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.364 SNIP 1.063 CiteScore 1.16
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.468 SNIP 1.073
Plasma resonance in anisotropic layered high-Tc superconductors

The plasma resonance is described theoretically by the inductive coupling model for a large stacked Josephson-junction system such as the intrinsic Josephson-junction array in anisotropic high-Tc superconductors. Eigenmodes of the plasma oscillation are analytically described and a numerical example for the large stack case \( N=50 \) is given. The scaling length characteristic of each mode is discussed. Numerical results for the plasma resonance for \( N=50 \) in the presence of an external rf drive with wave number \( k \) are given. For \( k \) different from zero possible resonance modes among the eigenoscillation modes are shown, and it is further demonstrated that for \( k=0 \) the resonance takes place as a collection of \( N \) independent resonant Josephson junctions. Some guidelines for possible experiments are shown. It is also shown that, very recent microwave experiments for the plasma resonance can be explained by this theory based on the inductive coupling, and collective longitudinal plasma oscillations are discussed.

General information
State: Published
Organisations: Electric Components, Department of Electrical Engineering, Electrotechnical Laboratory
Authors: Sakai, S. (Ekstern), Pedersen, N. F. (Intern)
Pages: 9810-9816
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Journal: Physical Review B Condensed Matter
Volume: B60
Issue number: 13
ISSN (Print): 0163-1829
Ratings:
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.16
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.933 SNIP 0.94 CiteScore 2.8
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.667 SNIP 1.262 CiteScore 3.3
JOSEPHSON-PLASMA, EXCITATION, VORTEX STATE, MODE, JUNCTIONS, Bi2Sr2CaCu2O8+DELTA

Electronic versions:
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DOIs:
10.1103/PhysRevB.60.9810

Links:

Bibliographical note
Copyright (1999) by the American Physical Society.
Source: orbit
Source-ID: 172372
Publication: Research - peer-review › Journal article – Annual report year: 1999
Radio-frequency properties of stacked long Josephson junctions with nonuniform bias current distribution

We have numerically investigated the behavior of stacks of long Josephson junctions considering a nonuniform bias profile. In the presence of a microwave field the nonuniform bias, which favors the formation of fluxons, can give rise to a change of the sequence of radio-frequency induced steps. The amplitude of the steps is enhanced when the external frequency matches the fluxon shuttling regime. ©1999 American Institute of Physics.

General information
State: Published
Organisations: Department of Physics, Technical University of Denmark
Authors: Filatrella, G. (Ekstern), Pedersen, N. F. (Intern)
Pages: 6904-6906
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Applied Physics
Volume: 85
Issue number: 9
ISSN (Print): 0021-8979
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.72 SJR 0.632 SNIP 0.815
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.618 SNIP 0.84 CiteScore 1.57
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.005 SNIP 1.18 CiteScore 2.04
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.165 SNIP 1.317 CiteScore 2.24
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.305 SNIP 1.294 CiteScore 2.13
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.373 SNIP 1.318 CiteScore 2.24
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.47 SNIP 1.195
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.518 SNIP 1.238
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.667 SNIP 1.338
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.708 SNIP 1.395
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.947 SNIP 1.649
Web of Science (2006): Indexed yes
RF properties of stacked long Josephson junctions with non-uniform bias

General information
State: Published
Organisations: Department of Electric Power Engineering, University of Salerno
Authors: Filatrella, G. (Ekstern), Pedersen, N. F. (Intern)
Pages: 6904 - 6910
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Journal: J. Appl Physics
Volume: 85
Original language: English
Source: orbit
Source-ID: 173269
Publication: Research - peer-review › Journal article – Annual report year: 1999

Superledere og deres anvendelser i stærkstrømskabler

General information
State: Published
Organisations: Department of Electric Power Engineering
Authors: Tønnesen, O. (Intern), Pedersen, N. F. (Intern)
Pages: 15-18
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Journal: Aktuel Naturvidenskab
Volume: 4
Ratings:
ISI indexed (2013): ISI indexed no
Effect of cross-type bias in a two-dimensional array of short Josephson junctions

We investigate numerically the effect of cross-type bias on two-dimensional arrays of short Josephson junctions. We have demonstrated that, for the simplest circuit, this type of bias is able to phase lock the junctions yielding a substantial improvement over ordinary biasing schemes. (C) 1998 American Institute of Physics.
Josephson plasma resonance in superconducting multilayers

We derive an analytical solution for the Josephson plasma resonance of superconducting multilayers. This analytical solution is derived mainly for low-T-c systems with magnetic coupling between the superconducting layers, but many features of our results are more general, and thus an application to the recently derived plasma resonance phenomena for high-T-c superconductors of the Bi2Sr2CaCu2Ox type is discussed. Our approach allows us to give full details of the different plasma resonance excitations, and we also predict the existence of new nonlinear effects, so far only identified in single junctions.

General information

State: Published
Organisations: Department of Physics
Authors: Pedersen, N. F. (Intern), Sakai, S. (Ekstern)
Pages: 2820-2826
Publication date: 1998
Main Research Area: Technical/natural sciences

Publication information

Journal: Physical Review B Condensed Matter
Volume: 58
Issue number: 5
ISSN (Print): 0163-1829
Ratings:
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Maximum supercurrent in two Josephson-junction stacks: Theory and experiment

The interaction between two long Josephson junctions in a stack is investigated experimentally in the absence of applied magnetic field. Mutual interaction is observed when both junctions or only one junction in the stack is in the zero voltage state. To account for the observed phenomena we propose a model that takes into account the nonuniform self-fields generated by the bias currents.

General information
State: Published
Organisations: Department of Physics, Università degli Studi di Salerno, Electrotechnical Laboratory
Authors: Carapella, G. (Ekstern), Costabile, G. (Ekstern), Sakai, S. (Ekstern), Pedersen, N. F. (Intern)
Pages: 6497-6505
Publication date: 1998
Main Research Area: Technical/natural sciences

Publication information
Journal: Physical Review B Condensed Matter
Volume: 58
Issue number: 10
ISSN (Print): 0163-1829
Ratings:
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.16
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.933 SNIP 0.94 CiteScore 2.8
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.667 SNIP 1.262 CiteScore 3.3
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.785 SNIP 1.339 CiteScore 3.55
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 3.206 SNIP 1.394 CiteScore 3.57
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 3.382 SNIP 1.438 CiteScore 3.61
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 3.417 SNIP 1.451
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 3.109 SNIP 1.474
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 2.982 SNIP 1.524
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 2.923 SNIP 1.546
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 2.796 SNIP 1.56
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 2.763 SNIP 1.607
Web of Science (2005): Indexed yes
Comparative dynamics of two-dimensional shorted arrays and continuous stacked Josephson junctions

Multilayer structures of Josephson junctions are discussed both in the continuous and the discrete case. For the continuous case some recent results are shown. For two-dimensional shorted arrays, which account for the discrete limit, a model is presented. Analytical and numerical calculations show typical features of coupled sine-Gordon systems such as the splitting of the limit velocity and modes of different symmetry which correspond to the different velocities. The discretization, however, adds interesting features, the most prominent of them being a strong interaction between solitons and discreteness-induced plasma waves.
Comparison of effective noise temperatures in YBa2Cu3O7-δ junctions
The dc voltage response to 70 GHz radiation was measured for YBCO bicrystal junctions, step edge junctions and ramp edge junctions at temperatures from 4 K to 90 K. Employing the RSJ-model and assuming thermal noise, the Josephson
radiation is about equal to the voltage difference of the voltage response to the small signal microwave irradiation. In the presence of excess noise, an effective noise temperature can be defined and is used as a figure of merit. In bicrystal grain boundary junctions with zero magnetic field the effective noise temperature was determined to be equal to the physical temperature within experimental error. Bicrystal grain boundary junctions with non-zero magnetic field, step edge junctions and ramp edge junctions showed excess noise. The scaling of the noise temperature is compared with the width of the junction in units of the Josephson penetration depth.
Current-voltage characteristics of YBa2Cu3O7 step-edge junctions on MgO substrates

General information
State: Published
Organisations: Department of Physics
Authors: Feng, Y. (Ekstern), Shen, Y. (Ekstern), Mygind, J. (Intern), Pedersen, N. F. (Intern), Wu, P. H. (Ekstern)
Pages: 2459-2460
Publication date: 1997
Main Research Area: Technical/natural sciences

Publication information
Journal: Physica C: Superconductivity and its Applications
Volume: 282-287
ISSN (Print): 0921-4534
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.575 SNIP 0.924 CiteScore 1.14
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.446 SNIP 0.888 CiteScore 0.99
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.497 SNIP 0.83 CiteScore 0.85
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.439 SNIP 0.7 CiteScore 0.79
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.55 SNIP 0.621 CiteScore 0.79
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.652 SNIP 0.607 CiteScore 0.94
Dynamics of stacked Josephson junctions

General information
State: Published
Organisations: Department of Physics
Authors: Pedersen, N. F. (Intern)
Pages: 423
Publication date: 1997
Main Research Area: Technical/natural sciences

Publication information
Journal: Physica C: Superconductivity and its Applications
Volume: 282-287
ISSN (Print): 0921-4534
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.575 SNIP 0.924 CiteScore 1.14
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.446 SNIP 0.888 CiteScore 0.99
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.497 SNIP 0.83 CiteScore 0.85
Flux-flow phenomenon in spatially nonuniform long Josephson junctions

General information
State: Published
Organisations: Department of Physics
Authors: Krasnov, V. (Ekstern), Pedersen, N. F. (Intern)
Number of pages: 222
Publication date: 1997

Host publication information
Title of host publication: Proceedings of the ISEC 97 conference
Place of publication: Berlin
Main Research Area: Technical/natural sciences
Conference: ISEC 97 conference, Berlin, 01/01/1997
Fluxon dynamics in long Josephson junctions in the presence of a temperature gradient or spatial nonuniformity

Fluxon dynamics in nonuniform Josephson junctions was studied both experimentally and theoretically. Two types of nonuniform junctions were considered: the first type had a nonuniform spatial distribution of critical and bias currents and the second had a temperature gradient applied along the junction. An analytical expression for the I-V curve in the presence of a temperature gradient or spatial nonuniformity was derived. It was shown that there is no static thermomagnetic Nernst effect due to Josephson fluxon motion despite the existence of a force pushing fluxons in the direction of smaller self-energy (from the cold to the hot end of the junction). A phenomenon, the "zero crossing flux flow step" (ZCFFS) with a nonzero voltage at a zero applied current, was observed in nonuniform long Josephson junctions. The phenomenon is due to the existence of a preferential direction for the Josephson vortex motion. ZCFFS's were observed at certain magnetic fields when the critical current in one direction but not the other becomes zero. Possible applications of nonuniform Josephson junctions in flux flow oscillators and as a superconducting diode are discussed.

General information
State: Published
Organisations: Department of Physics
Authors: Krasnov, V. (Ekstern), Oboznov, V. (Ekstern), Pedersen, N. F. (Intern)
Pages: 14486-14498
Publication date: 1997
Main Research Area: Technical/natural sciences

Publication information
Journal: Physical Review B Condensed Matter
Volume: 55
Issue number: 21
ISSN (Print): 0163-1829
Ratings:
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.16
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.933 SNIP 0.94 CiteScore 2.8
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.667 SNIP 1.262 CiteScore 3.3
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.785 SNIP 1.339 CiteScore 3.55
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 3.206 SNIP 1.394 CiteScore 3.57
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 3.382 SNIP 1.438 CiteScore 3.61
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 3.417 SNIP 1.451
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 3.109 SNIP 1.474
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 2.982 SNIP 1.524
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 2.923 SNIP 1.546
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 2.796 SNIP 1.56
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 2.763 SNIP 1.607
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 2.742 SNIP 1.606
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 2.75 SNIP 1.536
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 2.788 SNIP 1.706
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 2.946 SNIP 1.635
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 2.986 SNIP 1.631
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 3.115 SNIP 1.58

Original language: English

Perturbation analysis, mixed-state, penetration depth, vortex, single-crystals, Nernst, superconductors, Seebeck, vortices, critical-field

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10.1103/PhysRevB.55.14486
Links:

Bibliographical note
Copyright (1997) by the American Physical Society.

Source: orbit
Source-ID: 168438
Publication: Research - peer-review › Journal article – Annual report year: 1997

Lectures on superconductivity

General information
State: Published
Organisations: Department of Informatics and Mathematical Modeling, Department of Physics
Authors: Christiansen, P. L. (Intern), Pedersen, N. F. (Intern)
Pages: 3-31
Publication date: 1997

Host publication information
Title of host publication: Lectures on superconductivity
Place of publication: Woodbury
Publisher: American Institute of Physics
Main Research Area: Technical/natural sciences
Conference: Superconductivity in networks and mesoscopic systems, Pontignano, Italy, 01/01/1997
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Microwave dynamics and electromagnetic properties of YBa2Cu3O7 step-edge junctions on MgO substrates

General information
State: Published
Multi-terminal Abrikosov vortex flow structures at 77 K

General information
State: Published
Organisations: Department of Physics
Authors: Davidson, A. (Ekstern), Pedersen, N. F. (Intern)
Pages: 2503
Publication date: 1997
Main Research Area: Technical/natural sciences

Publication information
Journal: Physica C: Superconductivity and its Applications
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BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.575 SNIP 0.924 CiteScore 1.14
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.446 SNIP 0.888 CiteScore 0.99
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.497 SNIP 0.83 CiteScore 0.85
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.439 SNIP 0.7 CiteScore 0.79
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.55 SNIP 0.621 CiteScore 0.79
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.652 SNIP 0.607 CiteScore 0.94
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.63 SNIP 0.631
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.412 SNIP 0.56
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.67 SNIP 0.576
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.532 SNIP 0.716
Scopus rating (2006): SJR 0.667 SNIP 0.556
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.793 SNIP 0.656
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.779 SNIP 0.644
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 0.598 SNIP 0.592
Mutual Phase Locking of Fluxons in Stacked Long Josephson Junctions: Simulations and Experiment

We report on the experimental observation of reciprocal phase-locking in stacked $Nb-AlO_x-Nb$ Josephson junctions having overlap geometry. When the junctions are independently biased in zero external magnetic field, they each exhibit several Zero Field Steps. Biasing both the junctions on the Zero Field Steps, one with constant current while the other is swept along the step, we have observed phase locking between the fluxons in the two junctions and measured the phase locking range. We have found that the bound state can be very stable, and that the stack exhibits the same features reversing either the polarity of the bias current or the role of the junctions. An analogous investigation of the effect of the magnetic field on the stability of the bound state has been performed. Numerical simulations have shown that the underlying dynamics corresponding to this situation is a bound state of a fluxon-antifluxon pair. Finally the effect of rf radiation on the junctions has been investigated.

General information
State: Published
Organisations: Department of Physics, Università degli Studi di Salerno, NKT Research & Innovation A/S
Authors: Carapella, G. (Ekstern), Costabile, G. (Ekstern), Filatrella, G. (Ekstern), Mancher, M. (Ekstern), Mygind, J. (Intern), Nordahn, M. (Ekstern), Pedersen, N. F. (Intern), Petraglia, A. (Intern)
Pages: 2411-2414
Publication date: 1997
Main Research Area: Technical/natural sciences

Publication information
Journal: IEEE Transactions on Applied Superconductivity
Volume: 7
Issue number: 2
ISSN (Print): 1051-8223
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BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.42 SJR 0.395 SNIP 1.031
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.35 SNIP 0.935 CiteScore 1.27
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.47 SNIP 1.113 CiteScore 0.83
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.431 SNIP 1.171 CiteScore 1.32
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.575 SNIP 1.27 CiteScore 1.11
ISI indexed (2012): ISI indexed yes
Phase locked states in stacked Josephson junctions

General information
State: Published
Organisations: Department of Physics
Authors: Carapella, G. (Ekstern), Costabile, G. (Ekstern), Pedersen, N. F. (Intern), Petraglia, A. (Ekstern)
Number of pages: 551
Publication date: 1997

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Title of host publication: Applied superconductivity
Volume: 1
Place of publication: Bristol
Publisher: IOP Publishing Ltd
Main Research Area: Technical/natural sciences
Conference: EUCAS’97, Bristol, 01/01/1997
Source: orbit
Source-ID: 171368
Publication: Research › Journal article – Annual report year: 1997

Three terminal vortex injection device

General information
State: Published
Organisations: Department of Physics
Authors: Davidson, A. (Ekstern), Pedersen, N. F. (Intern)
Pages: 2403
Publication date: 1997
Main Research Area: Technical/natural sciences
External magnetic field and self-field effects in stacked long Josephson junctions

We have fabricated and tested samples consisting of two long stacked Josephson junctions with direct access to the intermediate electrode, whose thickness is smaller than London penetration depth $\lambda(L)$. The electrodes are patterned so that the junctions can be independently biased in the overlap geometry. We report the behaviour of the critical current of one junction as a function of an applied magnetic field (while the other junction is unbiased) and as a function of the bias current along the McCumber curve in the other junction. We find strong similarity in the two cases and compare the experimental results with numerical simulation.

Magnetic field decoupling and 3D-2D crossover in Nb/Cu multilayers

Transport properties of Nb/Cu multilayers were measured along and across layers. It is shown that not only the temperature but also the magnetic field parallel to layers can effectively decouple layers and cause the three-to-two-dimensional (3D-2D) crossover. As a consequence of the 3D-2D crossover, sharpening of the resistive transition with current along layers occurs due to the appearance of a strong intrinsic pinning in the 2D state. Evidence for the intrinsic Josephson effect in the 2D state is provided both by the periodic modulation of the dynamic resistance across layers versus the parallel magnetic field and by the multiply branched I-V curves caused by flux-flow of Josephson vortices in the stacked superconductor-normal-metal-superconductor junctions composing the multilayer. By measurements across layers the "breaking field" at which the proximity induced superconductivity in the normal layers of superconductor-normal-metal (Nb/Cu) multilayers is destroyed was observed directly. A dimensionality diagram in the (H-T) plane was deduced from our data. Reasons for complication of the "Fraunhofer pattern," $I$-$c(H)$, in "long" multilayers are discussed.
Microwave dynamics of YBCO bi-epitaxial Josephson structures

The processes of interaction of microwaves (frequency View the MathML source) with a single high-Tc superconducting YBa2Cu3Ox (YBCO) bi-epitaxial grain-boundary junction and with an array of two junctions connected in series, have been investigated experimentally at temperatures T = 4.2– 77 K, and magnetic fields B = −0.4 to +0.4 mT. The results obtained experimentally were used as the input data for computer simulation which confirms the hypothesis that the current through the grain-boundary junction is transported by a parallel array of lumped Josephson junctions. This model for a grain-boundary junction explains the observed unusual magnetic field dependence of the critical current Ic(B), and the deviations of dynamic processes from the predictions of the well known resistively shunted junction (RSJ) model: the existence of large amplitude subharmonic (View the MathML source) Shapiro steps, as well as the subharmonic detector response at weak magnetic fields φ <φ0. We also discuss the spectrum of this junction in connection with the half-integer Shapiro steps, and experimentally observed microwave field induced frequency synchronization of two series connected bi-epitaxial YBCO junctions.
On kink-dynamics of the perturbed sine-Gordon equation

General information
State: Published
Organisations: Department of Physics, Department of Informatics and Mathematical Modeling
Authors: Maksimov, A. (Ekstern), Pedersen, N. F. (Intern), Christiansen, P. L. (Intern), Molkov, J. (Ekstern), Nekorkin, V. (Ekstern)
Pages: 203-213
Publication date: 1996
Main Research Area: Technical/natural sciences

Publication information
Journal: Wave Motion
Volume: 23
ISSN (Print): 0165-2125
Phase locked fluxon-antifluxon states in stacked Josephson junctions

Measurements were made on a two-stack long Josephson junction with very similar parameters and electrical access to the thin middle electrode. Mutually phase-locked fluxon-antifluxon states were observed. The observed propagation velocity is in agreement with the theoretical prediction. The I-V curves recorded using the bias current in one of the junctions as fixed parameter show that these states continue to also exist when the other junction is oppositely biased. This is found in numerical simulations based on the experimental junction parameters as well. We propose a model in which waves in the junctions coexist with fluxons. (C) 1996 American Institute of Physics.
By studying soliton (fluxon) motion in long annular Josephson junctions it is possible to avoid the influence of the boundaries and soliton-soliton collisions present in linear junctions. A new experimental design consisting of a niobium coil placed on top of an annular junction has been used to insert individual fluxons or antifluxons into the junction in a controllable way. The dynamical behavior of different numbers of trapped fluxons was investigated. In addition, we were able to change the junction parameters by changing temperature. In some of the zero-field steps, the experiments reveal a small jump to higher values of the voltage at the top of the steps. This phenomenon can be caused by a crossover from a nonbunched state to a bunched state of the fluxon motion. By performing direct numerical simulations using the perturbed sine-Gordon equation with parameter values determined from the experiments we have been able to confirm the above explanation. ©1996 American Institute of Physics.
Transport properties of Nb/Cu multilayers in 2D and 3D state

General information
State: Published
Organisations: Department of Physics
Authors: Krasnov, V. (Ekstern), Kovalev, A. (Ekstern), Oboznov, V. (Ekstern), Pedersen, N. F. (Intern)
Pages: 715
Publication date: 1996
Main Research Area: Technical/natural sciences

Publication information
Journal: Czechoslovak Journal of Physics
Volume: 46 suppl
Issue number: S2
ISSN (Print): 0011-4626
Ratings:
Scopus rating (2009): SJR 0.221 SNIP 0.596
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.27 SNIP 0.743
Scopus rating (2007): SJR 0.181 SNIP 0.39
Scopus rating (2006): SJR 0.303 SNIP 0.495
Scopus rating (2005): SJR 0.233 SNIP 0.304
Scopus rating (2004): SJR 0.246 SNIP 0.47
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 0.162 SNIP 0.253
Scopus rating (2002): SJR 0.198 SNIP 0.337
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 0.228 SNIP 0.352
Scopus rating (2000): SJR 0.211 SNIP 0.353
Scopus rating (1999): SJR 0.331 SNIP 0.191
Original language: English
Source: orbit
Source-ID: 166419
Publication: Research - peer-review › Journal article – Annual report year: 1996

Numerical study of fluxon dynamics in a system of two-stacked Josephson junctions

The dynamics of magnetic fluxons in a system of two vertically stacked long Josephson junctions is investigated numerically. The model is based on the approach by S. Sakai, P. Bodin, and N. F. Pedersen [J. Appl. Phys. 73, 2411 (1993)] and is described by two strongly coupled sine-Gordon equations. In agreement with recent experimental data, we confirm numerically the effect of splitting of the fluxon travelling mode into two separated modes with different characteristic velocities. The simulated current-voltage characteristics indicate stable phase-locked flux-flow resonances of two junctions. These results support a possibility of application of the stacked long Josephson junctions as a system of coherent oscillators for millimeter and sub-millimeter wave bands. ©1995 American Institute of Physics.
600 GHz resonant mode in a parallel array of Josephson tunnel junctions connected by superconducting microstrip lines

The high frequency properties of the one-dimensional transmission line consisting of a parallel array of resistively shunted Josephson tunnel junctions have been studied in the limit of relatively low damping where this nonlinear system exhibits new and interesting phenomena. Here we report on experimental and numerical investigations of a resonant step observed at a voltage corresponding to 600 GHz in the dc current-voltage characteristic of a parallel array of 20 identical small NbAl2O3Nb Josephson junctions interconnected by short sections of superconducting microstrip line. The junctions are mutually phase locked due to collective interaction with the line sections excited close to the half wavelength resonance. The phase locking range can be adjusted by means of an external dc magnetic field and the step size varies periodically with the magnetic field. The largest step corresponds to a superconducting phase difference of pi between neighboring junctions. Journal of Applied Physics is copyrighted by The American Institute of Physics.
Dynamic behavior of Josephson-coupled layered structures

We have investigated Josephson effects in stacks of both artificial and natural Josephson junctions. The measurements have been performed on Nb/Al-AlO(x)/Nb multilayers and on small single crystals of Bi2Sr2CaCu2O8. Both systems
exhibit multiple branched I-V characteristics in zero magnetic field. In finite magnetic fields coupling via currents flowing along the superconducting layers is essential, since the layers are thinner than the London penetration depth. All observations are in good agreement with numerical simulations of stacks of coupled Josephson junctions. These simulations predict that a large number of junctions can be phase locked in large magnetic fields via Fiske resonances excited in all junctions.

**General information**
State: Published
Organisations: Department of Physics, Walther-Meissner-Institut, Forschungs Zentrum Jülich GmbH, Electrotechnical Laboratory
Authors: Kleiner, R. (Ekstern), Müller, P. (Ekstern), Kohlstedt, H. (Ekstern), Pedersen, N. F. (Intern), Sakai, S. (Ekstern)
Pages: 3942-3952
Publication date: 1994
Main Research Area: Technical/natural sciences

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Journal: Physical Review B Condensed Matter
Volume: 50
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ISSN (Print): 0163-1829

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BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.16
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BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.933 SNIP 0.94 CiteScore 2.8
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.667 SNIP 1.262 CiteScore 3.3
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.785 SNIP 1.339 CiteScore 3.55
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 3.206 SNIP 1.394 CiteScore 3.57
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 3.382 SNIP 1.438 CiteScore 3.61
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 3.417 SNIP 1.451
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 3.109 SNIP 1.474
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 2.982 SNIP 1.524
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 2.923 SNIP 1.546
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 2.796 SNIP 1.56
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 2.763 SNIP 1.607
A one-dimensional (1D) parallel array of shunted Josephson junctions is one of the basic elements in the family of rapid single-flux quantum logic circuits. It was found recently that current steps always show up in the current-voltage curve of the generator junction when an additional bias current is applied to the edge junction of the array. This effect was found to be due to the self-induced magnetic field produced by the edge current. This nonuniform field divides the array into domains each spanning several unit cells and each containing the same number of flux quanta. We report on experimental results obtained by low-temperature scanning electron microscopy (LTSEM) on the 1D array. The (1-3)-mum spatial resolution achieved by LTSEM enables us to image these domains in scanned measurements where the junctions in the array are heated sequentially. Computer simulations confirm the mechanism of the obtained images and the number of observed domains corresponds to the step position as predicted numerically.
Influence of the 3D-2D crossover on the critical current of Nb/Cu multilayers

We report the experimental observation of the Josephson critical current across layers, I(c) perpendicular-to, for Nb/Cu multilayers. Unique samples with a small cross section (20 mum in diameter) consisting of ten Nb/Cu junctions were fabricated for such measurements. A strong influence of the dimensional 3D-2D cross-over on the I(c)perpendicular-to was observed. Thus, as the temperature becomes smaller than T2D, hysteresis in the current-voltage characteristic appears and the behavior of the temperature dependence of the I(c)perpendicular-to changes. For T > T2D the diminishing of the hysteresis is caused by a sharp decrease of the junction capacitance in the 3D regime when the sample becomes uniform across layers. Calculation of the critical-current temperature dependence I(c)perpendicular-to (T) for our multilayers was made. An agreement between experimental and theoretical dependencies I(c)perpendicular-to (T) was found. From the theoretical simulations, we have obtained the dependence of the crossover and the critical temperatures of multilayers on the layer thicknesses, the boundary transparency, and layer conductivity.

General information
State: Published
Organisations: Department of Physics, Technical University of Denmark, Russian Academy of Sciences
Authors: Krasnov, V. M. (Ekstern), Pedersen, N. F. (Intern), Oboznov, V. A. (Ekstern)
Pages: 1106-1110
Publication date: 1994
Main Research Area: Technical/natural sciences

Publication information
Journal: Physical Review B Condensed Matter
Volume: 50
Issue number: 2
ISSN (Print): 0163-1829
Ratings:
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.16
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.933 SNIP 0.94 CiteScore 2.8
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.667 SNIP 1.262 CiteScore 3.3
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.785 SNIP 1.339 CiteScore 3.55
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 3.206 SNIP 1.394 CiteScore 3.57
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 3.382 SNIP 1.438 CiteScore 3.61
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 3.417 SNIP 1.451
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 3.109 SNIP 1.474
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 2.982 SNIP 1.524
Web of Science (2008): Indexed yes
The self-consistent equations, which have been derived recently as a microscopic model for the crossover between BCS superconductivity and Bose-Einstein condensation in a three-dimensional interacting Fermi system [R. Hausmann, Z Phys B 91, 291, (1993)], are solved numerically by repeated Fourier transformation. We find a superfluid transition temperature $T_c$ which increases monotonically with increasing attractive coupling strength. Furthermore, we determine the chemical potential $\mu_c$, the fermion distribution function $n(k)$, and the complex effective mass $m^*(\omega)$ of the fermion pairs $T=T_c$. The bound fermion pairs cause a power-law tail $\sim k^{-4}$ in $n(k)$ for large $k$ and behave as short-living quasi-particles in the crossover region, which is indicated by a large imaginary part of $2m^*(\omega)$.
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<td>1999</td>
<td>SJR 3.115 SNIP 1.58</td>
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Original language: English

ANOMALOUS TEMPERATURE-DEPENDENCE, PENETRATION DEPTH, SUPERCONDUCTORS, CRITICAL-FIELD, JUNCTIONS, ANISOTROPY

Electronic versions:
Falsig.pdf
DOIs:
10.1103/PhysRevB.49.12969
Links:

Bibliographical note
Microwave testing of high-T\textsubscript{c} based direct current to a single flux quantum converter

Design, simulation, and experimental investigations of a direct current to a single flux quantum converter loaded with a Josephson transmission line and driven by an external 70 GHz microwave oscillator are reported. The test circuit includes nine YBaCuO Josephson junctions aligned on the grain boundary of a 0°–32° asymmetric Y-ZrO\textsubscript{2} bicrystal substrate. The performance of such converters is important for the development of the fast Josephson samplers required for testing of high-T\textsubscript{c} rapid single flux quantum circuits in high-speed digital superconducting electronics. Journal of Applied Physics is copyrighted by The American Institute of Physics.
Theory and experiment on electromagnetic-wave-propagation velocities in stacked superconducting tunnel structures

Characteristic velocities of the electromagnetic waves propagating in vertically stacked Josephson transmission are theoretically discussed. An equation for solving n velocities of the waves in an n Josephson-junction stack is derived. The solutions of two- and threefold stacks are especially focused on. Furthermore, under the assumption that all parameters of the layers are equal, analytic solutions for a generic N-fold stack are presented. The velocities of the waves in two- and three-junction stacks by Nb-Al-AlOx-Nb systems are experimentally obtained by measuring the cavity resonance (Fiske step) modes. Comparison of the theory with the experimental data reveals good quantitative agreement.
Flux flow in high-Tc Josephson junctions
The possibility of achieving fluxon nucleation in nonhysteretic high-Tc Josephson junctions due to the presence of inhomogeneities is investigated numerically. For a large range of parameters the I- V characteristics in presence of such discontinuities show a strong similarity with those obtained experimentally. The spatial inhomogeneities considered are on the scale of the Josephson penetration depth (mum). It is demonstrated that the topic is of interest for the construction of amplifiers. Thus when fluxons are generated the resulting flux flow regime proves to be much more sensitive than the uniform solution to external fields.
Fluxon density waves in long Josephson junctions

Numerical simulations of the multiple fluxon dynamics stimulated by an external oscillating force applied at a boundary of a long Josephson junction are presented. The calculated IV characteristics agree well with a recent experimental observation of rf-induced satellite flux-flow steps. The voltage spacing between the satellites and the main flux-flow step corresponds to the second harmonic of the external frequency. We find that the satellite flux-flow modes are characterized by collective excitations propagating through the fluxon chain. These dynamical states can be interpreted as fluxon density waves.
Fluxons in thin-film superconductor-insulator superlattices
In a system of thin alternating layers of superconductors and insulators the equations describing static and dynamic fluxon solutions are derived. The approach, represented by a useful compact matrix form, is intended to describe systems fabricated for example of niobium or niobium-nitride thin films; in the limit of ultrathin superconductor films it may give a model for describing fluxon motion in layered high-Tc superconductors. Numerical examples of current versus voltage curves to be expected in such an experiment are presented. Journal of Applied Physics is copyrighted by The American Institute of Physics.
Josephson soliton oscillators in a superconducting thin film resonator

Josephson soliton oscillators integrated in a resonator consisting of two closely spaced coplanar superconducting microstrips have been investigated experimentally. Pairs of long 1-D Josephson junctions with a current density of about 1000 A/cm² were made using the Nb-AlOₓ-Nb trilayer technique. Different modes of half-wave resonances in the thin-film structure impose different magnetic field configurations at the boundaries of the junctions. The DC I-V characteristic shows zero-field steps with a number of resonator-induced steps. These structures are compared to RF-induced steps generated by phase-locking of the soliton motion to an external microwave source. The two different resonant configurations identified may be interpreted as a coupling to the microwave field at the end boundary and as a more homogeneous coupling distributed over the junction length.
Linewidth of Josephson oscillations in YBa2Cu3O7-x grain-boundary junctions

The AC Josephson effect in YBa2Cu3O7-x grain-boundary junctions (GBJs) was studied in the temperature range from 4 K to 90 K. The temperature dependence of the linewidth of millimeter-wave Josephson oscillations was measured, and it is shown that the derived effective noise temperature of GBJ might be as low as the physical temperature in the temperature range investigated. This makes it possible to use the resistively shunted junction (RSJ) model with thermal fluctuations to get a limiting performance of high-Tc devices utilizing the AC Josephson effect. The lowest value of the linewidth of 72 GHz Josephson oscillations observed at 77 K was equal to 380 MHz, which demonstrates the applicability of GBJ, particularly in the field of radiation spectroscopy, even at liquid nitrogen temperatures.

General information
State: Published
Organisations: Department of Physics, Technical University of Denmark
Authors: Divin, Y. Y. (Ekstern), Mygind, J. (Intern), Pedersen, N. F. (Intern), Chaudhari, P. (Ekstern)
Pages: 2337-2340
Publication date: 1993
Main Research Area: Technical/natural sciences

Publication information
Journal: IEEE Transactions on Applied Superconductivity
Volume: 3
Issue number: 1, part 4
ISSN (Print): 1051-8223
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.42 SJR 0.395 SNIP 1.031
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.35 SNIP 0.935 CiteScore 1.27
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.47 SNIP 1.113 CiteScore 0.83
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.431 SNIP 1.171 CiteScore 1.32
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.575 SNIP 1.27 CiteScore 1.11
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.364 SNIP 1.063 CiteScore 1.16
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.468 SNIP 1.073
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.452 SNIP 1.033
Web of Science (2009): Indexed yes
Millimeter-wave response and linewidth of Josephson oscillations in YBa2Cu3O7 step-edge junctions

We have studied the response of YBa2Cu3O7 step-edge junctions to low-intensity millimeter-wave radiation in the temperature range from 4 to 80 K. The linewidth of the Josephson oscillations derived from the resonant part of the response at voltages $V \cong (h/2e)f$ is shown to be determined by thermal fluctuations at liquid nitrogen temperatures. At lower temperatures the observed linewidth increases indicating that low-frequency fluctuations become dominant in the junction as the temperature is reduced. Due to an inhomogeneous spatial distribution of the current the step-edge junction might be considered as a multijunction multiloop interferometer and the excess noise can be discussed in terms of spontaneous transitions between the different states of these interferometers.

General information
State: Published
Organisations: Department of Physics, Biophysics and Fluids, Technical University of Denmark, Forschungs Zentrum Jülich GmbH
Authors: Divin, Y. Y. (Ekstern), Andreev, A. V. (Ekstern), Fischer, G. M. (Intern), Mygind, J. (Intern), Pedersen, N. F. (Intern), Herrmann, K. (Ekstern), Glyantsev, V. N. (Ekstern), Siegel, M. (Ekstern), Braginski, A. I. (Ekstern)
Pages: 1295-1297
Publication date: 1993
Main Research Area: Technical/natural sciences

Publication information
Volume: 62
Issue number: 11
ISSN (Print): 0003-6951
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 2.67 SJR 1.132 SNIP 0.996
Radiation detection from phase-locked serial dc SQUID arrays

We report on synchronous operation of series arrays of inductively coupled superconducting quantum interference devices (SQUIDs). Each array consisted of N=3 or 11 dc SQUIDs with common inductances providing a strong interaction between neighboring cells. Externally shunted (β~1) trilayer Nb—AlO$_x$—Nb Josephson junctions were used. Coherent radiation was detected in the frequency range f=67–73 GHz while the array voltage was V=NfΦ$0$ (Φ$0$=2.07×10$^{-15}$ V s). The stability of the coherent state was influenced by the external dc magnetic field. The linewidth depended on the external loading. For small loading it was N times smaller than expected for a single cell. The influence of the inductive coupling mechanism on the operation of discrete Josephson junction circuits and the similarity to the coupling in layered structures of long Josephson junctions is discussed. Journal of Applied Physics is copyrighted by The American Institute of Physics.

General information
State: Published
Organisations: Quantum Physics and Information Technology, Department of Physics, Technical University of Denmark
Authors: Kaplunenko, V. K. (Ekstern), Mygind, J. (Intern), Pedersen, N. F. (Intern), Ustinov, A. V. (Ekstern)
Pages: 2019-2023
Publication date: 1993
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Applied Physics
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ISSN (Print): 0021-8979
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BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.72 SJR 0.632 SNIP 0.815
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.618 SNIP 0.84 CiteScore 1.57
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.005 SNIP 1.18 CiteScore 2.04
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.165 SNIP 1.317 CiteScore 2.24
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.305 SNIP 1.294 CiteScore 2.13
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.373 SNIP 1.318 CiteScore 2.24
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.47 SNIP 1.195
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.518 SNIP 1.238
Self-induced magnetic field effects caused by edge currents in parallel array of Josephson junctions

General information
State: Published
Organisations: Theoretical Atomic-scale Physics, Department of Physics, Quantum Physics and Information Technology
Authors: Kaplunenko, V. K. (Ekstern), Goldobin, E. B. (Ekstern), Khabipov, M. I. (Ekstern), Larsen, B. H. (Intern), Mygind, J. (Intern), Pedersen, N. F. (Intern)
Pages: 5854-5858
Publication date: 1993
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Applied Physics
Volume: 74
Issue number: 9
ISSN (Print): 0021-8979
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.72 SJR 0.632 SNIP 0.815
Experiments on the interaction between long Josephson junctions and a coplanar strip resonator

Experiments are reported on a new geometry designed to couple long Josephson junction fluxon oscillators to a resonant cavity. The junctions were made with a niobium-aluminum oxide-niobium trilayer process with a critical-current density of around 1000 A/cm². Various numbers of such junctions were incorporated directly as part of a coplanar strip half-wave resonator, with fundamental mode of about 34 GHz. Both the current density and oscillation frequency are higher than in previous experiments. Evidence for phase locking of multiple junctions is presented. Applied Physics Letters is copyrighted by The American Institute of Physics.

General information
State: Published
Organisations: Department of Physics, International Business Machines Corp.
Authors: Davidson, A. (Ekstern), Pedersen, N. F. (Intern)
Pages: 2017-2019
Publication date: 1992
Main Research Area: Technical/natural sciences

Publication information
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BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 2.67 SJR 1.132 SNIP 0.996
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.085 SNIP 0.983 CiteScore 2.47
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.799 SNIP 1.462 CiteScore 3.25
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.149 SNIP 1.652 CiteScore 3.77
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 2.554 SNIP 1.754 CiteScore 3.76
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 2.805 SNIP 1.94 CiteScore 4.04
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 2.926 SNIP 1.789
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 2.857 SNIP 1.848
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Josephson oscillations and noise temperatures in YBa$_2$Cu$_3$O$_{7-x}$ grain-boundary junctions
The ac Josephson effect was studied in YBa$_2$Cu$_3$O$_{7-x}$ grain-boundary junctions (GBJ) in the temperature range from 4 to 90 K. The temperature dependence of the linewidth of millimeter-wave Josephson oscillations was measured and it is shown that the derived effective noise temperatures may be as low as the physical temperature in the temperature range investigated. In the millimeter-wave range, linewidths as low as 380 MHz were found at liquid-nitrogen temperatures.

Applied Physics Letters is copyrighted by The American Institute of Physics.
Millimeter-wave-induced fluxon pair creation in flux-flow Josephson oscillators

We now observe a new type of dynamical state in long Josephson junctions. Millimeter-wave irradiation in the frequency range $f_{\text{ext}}=62–77$ GHz, was applied to a long junction biased in the flux-flow mode. Besides an ordinary flux-flow step satellite, flux-flow steps with voltage spacing corresponding to $2f_{\text{ext}}$ were observed. The dependence of the amplitude of the satellite steps on external magnetic field and microwave power was measured. An explanation of the satellite steps as mixing products due to the microwave-assisted reflection of fluxons into antifluxons at the junction boundary is presented.
Model studies of long Josephson junction arrays coupled to a high-Q resonator

Series-biased arrays of long Josephson junction fluxon oscillators can be phase locked by mutual coupling to a high-Q, linear distributed resonator. A simplified model of such a device, consisting of junctions described by the particle-map perturbation theory approach which are capacitively coupled to a lumped, linear tank circuit, reproduce the essential experimental observations at a very low computational cost. A more sophisticated model, consisting of partial differential equation descriptions of the junctions, again mutually coupled to a linear tank, substantially confirm the predictions of the simplified model. In the particle-map model, the locking range in junction bias current increases linearly with the coupling capacitance; in the partial differential equation (p.d.e.) model, this holds up to a certain maximum value of the capacitance, after which a saturation of the locking range is observed. In both models, for a given spread of junction lengths, the existence of a minimum value of the capacitance for locking to a tank with a given resonant frequency is evidenced.

Journal of Applied Physics is copyrighted by The American Institute of Physics.
Fluxon electronic devices
The basic theory and properties of fluxons on Josephson transmission lines (JTL) are outlined. Basic experimental properties are illustrated by examples from the literature. RF applications and analog amplifier applications based on fluxons are discussed.

General information
State: Published
Organisations: Electric Components, Department of Electrical Engineering
Authors: Pedersen, N. F. (Intern)
Pages: 3328-3334
Publication date: 1991
Main Research Area: Technical/natural sciences

Publication information
Journal: I E E E Transactions on Magnetics
Volume: 27
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ISSN (Print): 0018-9464
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.48 SNIP 0.915 CiteScore 1.47
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.565 SNIP 1.207 CiteScore 1.77
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.715 SNIP 1.491 CiteScore 1.68
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.608 SNIP 1.424 CiteScore 1.75
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.788 SNIP 1.574 CiteScore 1.89
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.829 SNIP 1.445 CiteScore 1.69
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.698 SNIP 1.134
BFI (2009): BFI-level 1
Numerical study of long Josephson junctions coupled to a high-Q cavity

Long Josephson junctions coupled to a high-Q resonator are studied numerically and compared with recently published approximative results, obtained by using a perturbative approach to the fluxon motion in the junction. The similarities and differences in the two approaches are discussed.
Crises in a driven Josephson junction studied by cell mapping

We use the method of cell-to-cell mapping to locate attractors, basins, and saddle nodes in the phase plane of a driven Josephson junction. The cell-mapping method is discussed in some detail, emphasizing its ability to provide a global view of the phase plane. Our computations confirm the existence of a previously reported interior crisis. In addition, we observe
a boundary crisis for a small shift in one parameter. The cell-mapping method allows us to show both crises explicitly in the phase plane, at low computational cost.
Amplitude calculation near a period-doubling bifurcation: An example

For the rf-driven Josephson junction, the dynamical behavior is studied near a period-doubling transition. The center-manifold theorem simplifies the problem and enables us to study only a first-order system, the parameters of which are expressed in terms of the Josephson-junction parameters.
Influence of noise and near-resonant perturbations on bifurcations in Josephson junctions

The stabilization of a nonlinear system against period-doubling bifurcations by means of a periodic perturbation has been investigated. With the Josephson junction as a model system, both numerical simulations (including noise) and measurements on Josephson tunnel junctions have been performed. The effect of the noise is found to be of fundamental importance.

**General information**

State: Published
Organisations: Quantum Physics and Information Technology, Department of Physics
Authors: Svensmark, H. (Intern), Hansen, J. B. (Ekstern), Pedersen, N. F. (Intern)
Pages: 1457-1459
Analytic solutions for a fluxon in a long Josephson junction in the presence of surface losses (\(\beta\) term) as well as shunt losses (\(\alpha\) term) are obtained by assuming a triangular current-phase relation. This theoretical result provides exact information on fluxon properties (e.g., the line shape, velocity, etc.), independent of the magnitude of \(\alpha\) and \(\beta\). We find that if \(\beta\) is smaller than a critical value, the fluxon behavior is similar to that of the \(\beta=0\) case, but if \(\beta\) is larger, quite different behavior is observed, particularly in the high-velocity region.
Effect of surface losses on soliton propagation in Josephson junctions

We have explored numerically the effects on soliton propagation of a third order damping term in the modified sine-Gordon equation. In Josephson tunnel junctions such a term corresponds physically to quasiparticle losses within the metal electrodes of the junction. We find that this loss term plays the dominant role in determining the shape and stability of the soliton at high velocity. Applied Physics Letters is copyrighted by The American Institute of Physics.
Experiments on soliton motion in annular Josephson junctions

We report here the results of an extensive experimental investigation of soliton dynamics in Josephson junctions of different annular geometries. The annular geometry is unique in that it allows for the study of undisturbed soliton motion as well as soliton-antisoliton collisions, since there are no boundary effects. We have successfully trapped a single soliton in an annular junction and found good agreement with perturbation theory at low soliton velocity, and evidence of departure from perturbation theory at higher velocity. We also discuss the observation of fine structure on the I-V curve for a single trapped soliton, and evidence linking the stability of the soliton to surface damping. Journal of Applied Physics is copyrighted by The American Institute of Physics.

General information
State: Published
Organisations: Department of Physics, Technical University of Denmark
Authors: Davidson, A. (Ekstern), Dueholm, B. (Ekstern), Pedersen, N. F. (Intern)
Pages: 1447-1454
Publication date: 1986
Main Research Area: Technical/natural sciences

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BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.72 SJR 0.632 SNIP 0.815
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.618 SNIP 0.84 CiteScore 1.57
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.005 SNIP 1.18 CiteScore 2.04
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.165 SNIP 1.317 CiteScore 2.24
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.305 SNIP 1.294 CiteScore 2.13
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.373 SNIP 1.318 CiteScore 2.24
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
Perturbation treatment of boundary conditions for fluxon motion in long Josephson junctions

The sine-Gordon equation governing the motion of fluxons in the long Josephson junction is investigated by transforming it into a relativistic-particle equation of motion and using a perturbational approach. The effects of a finite junction length, an external magnetic field, as well as the effects of fluxon-antifluxon collisions are included in the calculations. All theoretical results are compared to numerical simulations in order to investigate the validity of the approach. Good agreement is found in most cases.
Prediction of chaos in a Josephson junction by the Melnikov-function technique
The Melnikov function for prediction of Smale horseshoe chaos is applied to the rf-driven Josephson junction. Linear and quadratic damping resistors are considered. In the latter case the analytic solution including damping and dc bias is used to obtain an improved threshold curve for the onset of chaos. The prediction is compared to new computational solutions. The Melnikov technique provides a good, but slightly low, estimate of the chaos threshold.

General information
State: Published
Organisations: Department of Informatics and Mathematical Modeling, Department of Physics, Technical University of Denmark
Authors: Bartuccelli, M. (Ekstern), Christiansen, P. L. (Intern), Pedersen, N. F. (Intern), Sørensen, M. P. (Intern)
Pages: 4686-4691
Publication date: 1986
Main Research Area: Technical/natural sciences

Publication information
Journal: Physical Review B Condensed Matter
Volume: 33
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ISSN (Print): 0163-1829
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Web of Science (2017): Indexed yes
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Scopus rating (2016): CiteScore 3.16
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.933 SNIP 0.94 CiteScore 2.8
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.667 SNIP 1.262 CiteScore 3.3
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.785 SNIP 1.339 CiteScore 3.55
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 3.206 SNIP 1.394 CiteScore 3.57
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 3.382 SNIP 1.438 CiteScore 3.61
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 3.417 SNIP 1.451
Web of Science (2010): Indexed yes
Simulations of fine structures on the zero field steps of Josephson tunnel junctions

Fine structures on the zero field steps of long Josephson tunnel junctions are simulated for junctions with the bias current injected into the junction at the edges. These structures are due to the coupling between self-generated plasma oscillations and the traveling fluxon. The plasma oscillations are generated by the interaction of the bias current with the fluxon at the junction edges. On the first zero field step, the voltages of successive fine structures are given by \( V_n = \frac{\hbar}{2e}(2\Omega_{gap}/n) \), where \( n \) is an even integer. Applied Physics Letters is copyrighted by The American Institute of Physics.

General information
State: Published
Organisations: Department of Physics
Authors: Scheuermann, M. (Ekstern), Chi, C. C. (Ekstern), Pedersen, N. F. (Intern), Chang, J. (Ekstern), Chen, J. T. (Ekstern)
Pages: 189-191
Publication date: 1986
Main Research Area: Technical/natural sciences

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BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 2.67 SJR 1.132 SNIP 0.996
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.085 SNIP 0.983 CiteScore 2.47
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.799 SNIP 1.462 CiteScore 3.25
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.149 SNIP 1.652 CiteScore 3.77
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 2.554 SNIP 1.754 CiteScore 3.76
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 2.805 SNIP 1.94 CiteScore 4.04
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 2.926 SNIP 1.789
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 2.857 SNIP 1.848
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 2.934 SNIP 1.83
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 3.039 SNIP 1.913
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 3.457 SNIP 2.288
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 3.709 SNIP 2.382
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 3.904 SNIP 2.38
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 3.765 SNIP 2.27
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 3.917 SNIP 2.365
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 4.111 SNIP 2.212
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 4.277 SNIP 2.013
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 4.35 SNIP 2.11

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Switching between dynamic states in intermediate-length Josephson junctions

The appearance of zero-field steps (ZFS's) in the current-voltage characteristics of intermediate-length overlap-geometry Josephson tunnel junctions described by a perturbed sine-Gordon equation (PSGE) is associated with the growth of parametrically excited instabilities of the McCumber background curve (MCB). A linear stability analysis of a McCumber solution of the PSGE in the asymptotic linear region of the MCB and in the absence of magnetic field yields a Hill's equation which predicts how the number, locations, and widths of the instability regions depend on the junction parameters. A numerical integration of the PSGE in terms of truncated series of time-dependent Fourier spatial modes verifies that the parametrically excited instabilities of the MCB evolve into the fluxon oscillations characteristic of the ZFS's. An approximate analysis of the Fourier mode equations in the presence of a small magnetic field yields a field-dependent Hill's equation which predicts that the major effect of such a field is to reduce the widths of the instability regions. Experimental measurements on Nb-NbxOy-Pb junctions of intermediate length, performed at different operating temperatures in order to vary the junction parameters and for various magnetic field values, verify the physical existence of switching from the MCB to the ZFS's. Good qualitative, and in many cases quantitative, agreement between analytic, numerical, and experimental results is obtained.

General information
State: Published
Organisations: Department of Informatics and Mathematical Modeling, Applied functional analysis, Department of Mathematics, Biophysics and Fluids, Department of Physics, Technical University of Denmark
Authors: Pagano, S. (Ekstern), Sørensen, M. P. (Intern), Parmentier, R. D. (Ekstern), Christiansen, P. L. (Intern), Skovgaard, O. (Intern), Mygind, J. (Intern), Pedersen, N. F. (Intern), Samuelsen, M. R. (Intern)
Pages: 174-182
Publication date: 1986
Main Research Area: Technical/natural sciences

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Volume: 33
Issue number: 1
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Ratings:
Web of Science (2017): Indexed yes
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Scopus rating (2016): CiteScore 3.16
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.933 SNIP 0.94 CiteScore 2.8
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.667 SNIP 1.262 CiteScore 3.3
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.785 SNIP 1.339 CiteScore 3.55
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 3.206 SNIP 1.394 CiteScore 3.57
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
Experimental Investigation of Trapped Sine-Gordon Solitons

We have observed for the first time a single sine-Gordon soliton trapped in an annular Josephson junction. This system offers a unique possibility to study undisturbed soliton motion. In the context of perturbation theory, the soliton may be viewed as a relativistic particle moving under a uniform force with damping. Accordingly our experimental results are displayed directly in a force-versus-momentum plane, where they may be described by a theoretically derived universal curve.

General information
State: Published
Organisations: Department of Physics, Technical University of Denmark
Authors: Davidson, A. (Ekstern), Dueholm, B. (Ekstern), Kryger, B. (Ekstern), Pedersen, N. F. (Intern)
Pages: 2059-2062
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BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 6.33 SJR 3.56 SNIP 2.133
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 3.823 SNIP 2.205 CiteScore 5.76
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 5.027 SNIP 2.646 CiteScore 6.62
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 5.674 SNIP 2.796 CiteScore 7.46
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 6.243 SNIP 2.845 CiteScore 7.19
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 6.252 SNIP 2.886 CiteScore 7.02
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 6.418 SNIP 2.764
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 6.342 SNIP 2.94
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 6.223 SNIP 2.854
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 6.14 SNIP 2.862
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 5.645 SNIP 2.807
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 5.35 SNIP 2.938
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 5.312 SNIP 2.976
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 5.33 SNIP 2.93
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 5.441 SNIP 3.089
Web of Science (2002): Indexed yes
Web of Science (2001): Indexed yes
Experimental relationship between damping and stability of sine-Gordon solitons in Josephson junctions

We show some experimental results which suggest that total damping, including surface loss, plays a fundamental role in limiting the stability of high-velocity sine-Gordon solitons in real Josephson tunnel junctions.

General information
State: Published
Organisations: Department of Physics, Technical University of Denmark
Authors: Davidson, A. (Ekstern), Pedersen, N. F. (Intern), Dueholm, B. (Ekstern)
Pages: 7558-7560
Publication date: 1985
Main Research Area: Technical/natural sciences

Publication information
Journal: Physical Review B Condensed Matter
Volume: 32
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Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.16
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.933 SNIP 0.94 CiteScore 2.8
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.667 SNIP 1.262 CiteScore 3.3
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.785 SNIP 1.339 CiteScore 3.55
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 3.206 SNIP 1.394 CiteScore 3.57
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 3.382 SNIP 1.438 CiteScore 3.61
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Comparison between experiment and perturbation theory for solitons in Josephson junctions

Experiments have been made on long inline and overlap Josephson junctions at various temperatures and current densities. The junctions had parameters such that the recently developed perturbation theory for soliton motion according to the modified sine-Gordon equation should be applicable. A comparison showed that this is the case, and the damping constant was derived as a function of the temperature. In addition, results were obtained for the soliton-antisoliton annihilation process. A fine structure in the zero-field steps at low temperatures is interpreted as being due to plasma oscillations in connection with soliton reflections at the boundaries.
Magnetic field dependence of microwave radiation in intermediate-length Josephson junctions

Experimental measurements of current-voltage structure and emitted X-band radiation in applied magnetic field from overlap-geometry Josephson tunnel junctions of normalized length about 2 are compared with numerical simulations obtained with the use of a perturbed sine-Gordon model. The simulations furnish the current and field dependence of the oscillation configuration, from which can be calculated average voltages, frequencies, and power spectra. Simulation and experimental results are in good agreement with regard to the lobe structure of the height of the first zero-field step and/or second Fiske step in magnetic field and the field dependence of the radiation frequency within the various lobes, including details such as hysteresis between lobes. The simulations predict an alternation of the dominant frequency component with increasing field that accounts well for the experimental observations. The usefulness and limitations of cavity-mode analyses, both singlemode and multimode, are evidenced by comparison with the simulation results.

General information
State: Published
Organisations: Department of Informatics and Mathematical Modeling, Applied functional analysis, Department of Mathematics, Department of Physics, Biophysics and Fluids, Technical University of Denmark
Authors: Sørensen, M. P. (Intern), Parmentier, R. D. (Ekstern), Christiansen, P. L. (Intern), Skovgaard, O. (Intern), Dueholm, B. (Ekstern), Jørgensen, E. (Ekstern), Koshelets, V. P. (Ekstern), Leving, O. A. (Ekstern), Monaco, R. (Intern), Mygind, J. (Intern), Pedersen, N. F. (Intern), Samuelsen, M. R. (Intern)
Pages: 2640-2648
Publication date: 1984
Main Research Area: Technical/natural sciences

Publication information
Journal: Physical Review B Condensed Matter
Volume: 30
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ISSN (Print): 0163-1829
Ratings:
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.16
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.933 SNIP 0.94 CiteScore 2.8
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.667 SNIP 1.262 CiteScore 3.3
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.785 SNIP 1.339 CiteScore 3.55
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 3.206 SNIP 1.394 CiteScore 3.57
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 3.382 SNIP 1.438 CiteScore 3.61
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
Fluxon-antifluxon annihilation in the perturbed sine-Gordon equation with loss and driving terms is investigated. For the infinite line we find a simple analytic expression for the threshold driving term corresponding to annihilation. With the application of the results to a Josephson junction of finite length an expression for the current voltage characteristic of a zero-field step is derived. The analytical results are in good agreement with numerical simulations. The method is extendable to other systems.
The motion of a single fluxon in long Josephson-junctions of overlap and inline geometries is investigated in the presence of an applied external magnetic field. The form of the first zero-field step for various parameters is given in closed analytic forms in both cases, and the differences and similarities between the two geometries are emphasized. Journal of Applied Physics is copyrighted by The American Institute of Physics.
Scopus rating (2009): SJR 1.518 SNIP 1.238
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.667 SNIP 1.338
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.708 SNIP 1.395
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.947 SNIP 1.649
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 2.034 SNIP 1.627
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 2.097 SNIP 1.602
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 2.019 SNIP 1.525
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 2.225 SNIP 1.674
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 2.079 SNIP 1.554
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 2.338 SNIP 1.543
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 2.071 SNIP 1.517

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RF Applications of Superconducting Tunnelling Devices

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Organisations: Department of Physics
Authors: Pedersen, N. F. (Intern)
Pages: 88-96
Publication date: 1983

Host publication information
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Publisher: IEEE
Main Research Area: Technical/natural sciences
Electronic versions:
Falsig.pdf
DOIs:
10.1109/EUMA.1983.333213

Bibliographical note
Copyright: 1983 IEEE. Personal use of this material is permitted. However, permission to reprint/republish this material for advertising or promotional purposes or for creating new collective works for resale or redistribution to servers or lists, or to reuse any copyrighted component of this work in other works must be obtained from the IEEE
Fluxon motion in long overlap and in-line Josephson junctions

The motion of a single fluxon in long Josephson junctions of the overlap and inline geometries is investigated. It is concluded that if the junction is long and the damping is not too large then zero-field steps exist also in the inline junction. These zero-field steps are found to be mathematically identical to those of the overlap junctions in spite of the fact that the fluxon dynamics are quite different in the two cases. Applied Physics Letters is copyrighted by The American Institute of Physics.
Microstrip coupling techniques applied to thin-film Josephson junctions at microwave frequencies

Three different schemes for coupling to low impedance Josephson devices have been investigated. They all employ superconducting thin-film microstrip circuit techniques. The schemes are: (i) a quarterwave stepped impedance transformer, (ii) a microstrip resonator, (iii) an adjustable impedance transformer in inverted microstrip. Using single microbridges to probe the performance we found that the most promising scheme in terms of coupling efficiency and useful bandwidth was the adjustable inverted microstrip transformer.

General information
State: Published
Organisations: Department of Physics, Technical University of Denmark, University of Copenhagen
Authors: Sørensen, O. H. (Ekstern), Pedersen, N. F. (Intern), Mygind, J. (Intern), Dueholm, B. (Ekstern), Finnegan, T. (Ekstern), Hansen, J. (Ekstern), Lindelof, P. (Ekstern)
Pages: 107-110
Publication date: 1981
Main Research Area: Technical/natural sciences

Publication information
Journal: I E E E Transactions on Magnetics
Volume: 17
Issue number: 1
ISSN (Print): 0018-9464
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Multisoliton excitations in long Josephson junctions

The microwave emission from long Josephson tunnel junctions dc-current biased on zero-field and Fiske steps has been measured. The frequency and power variation on all steps of the narrow-linewidth radiation near the fundamental cavity-
mode frequency and the observed transitions between different modes on a given step may be understood in a picture of mutual fluxon excitations with propagation of different bunched fluxon configurations depending on the current and magnetic field bias.

**General information**

State: Published

Organisations: Biophysics and Fluids, Department of Physics, Technical University of Denmark

Authors: Dueholm, B. (Ekstern), Levring, O. A. (Ekstern), Mygind, J. (Intern), Pedersen, N. F. (Intern), Sørensen, O. H. (Ekstern), Cirillo, M. (Ekstern)

Pages: 1299-1302

Publication date: 1981

Main Research Area: Technical/natural sciences

**Publication information**

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BFI (2017): BFI-level 2

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BFI (2016): BFI-level 2

Scopus rating (2016): CiteScore 6.33 SJR 3.56 SNIP 2.133

Web of Science (2016): Indexed yes

BFI (2015): BFI-level 2

Scopus rating (2015): SJR 3.823 SNIP 2.205 CiteScore 5.76

Web of Science (2015): Indexed yes

BFI (2014): BFI-level 2

Scopus rating (2014): SJR 5.027 SNIP 2.646 CiteScore 6.62

Web of Science (2014): Indexed yes

BFI (2013): BFI-level 2

Scopus rating (2013): SJR 5.674 SNIP 2.796 CiteScore 7.46

ISI indexed (2013): ISI indexed yes

Web of Science (2013): Indexed yes

BFI (2012): BFI-level 2

Scopus rating (2012): SJR 6.243 SNIP 2.845 CiteScore 7.19

ISI indexed (2012): ISI indexed yes

Web of Science (2012): Indexed yes

BFI (2011): BFI-level 2

Scopus rating (2011): SJR 6.252 SNIP 2.886 CiteScore 7.02

ISI indexed (2011): ISI indexed yes

Web of Science (2011): Indexed yes

BFI (2010): BFI-level 2

Scopus rating (2010): SJR 6.418 SNIP 2.764

Web of Science (2010): Indexed yes

BFI (2009): BFI-level 2

Scopus rating (2009): SJR 6.342 SNIP 2.94

Web of Science (2009): Indexed yes

BFI (2008): BFI-level 2

Scopus rating (2008): SJR 6.223 SNIP 2.854

Web of Science (2008): Indexed yes

Scopus rating (2007): SJR 6.14 SNIP 2.862

Web of Science (2007): Indexed yes

Scopus rating (2006): SJR 5.645 SNIP 2.807

Web of Science (2006): Indexed yes

Scopus rating (2005): SJR 5.35 SNIP 2.938
Externally pumped millimeter-wave Josephson-junction parametric amplifier

A unified theory of the singly and doubly degenerate Josephson-junction parametric amplifier is presented. Experiments with single junctions on both amplifier modes at frequencies 10, 35, and 70 GHz are discussed. Low-noise temperature (∼100 K, single sideband (SSB)) and reasonable gain (∼8 dB) were obtained at 35 GHz in the singly degenerate mode. On the basis of the theory and experiments, a general procedure for optimizing junction parameters is discussed and illustrated by the specific design of a 100-GHz amplifier.
A comprehensive account of the theory of the singly quasidegenerate Josephson junction parametric amplifier is given. In this mode the signal and idler frequencies are both approximately equal to half the pump frequency, and hence the signal and idler channels have a common termination. It is shown that the performance of the amplifier characterized by properties such as gain-bandwidth product, noise temperature, and saturation depends strongly on the embedding microwave circuit. In particular any uncompensated series reactance may deteriorate the overall performance. Internal shot and Johnson noise as well as incident thermal radiation is included in the discussion. It is shown that the noise temperature is virtually independent of noise injected from external sources and that minimum noise temperature is automatically achieved if the amplifier is tuned to maximize the gain-bandwidth product. The analytical results are illustrated by self-consistent numerical solutions of the circuit equations. Journal of Applied Physics is copyrighted by The American Institute of Physics.
Grundfagligt Speciale: An advanced laboratory-research course for nonphysicists taught by physicists

The pedagogical and research advantages of an advanced laboratory-research course for nonphysicists taught by physicists are discussed. The practical considerations which determine the structure and content of such a course are emphasized with particular attention given to those features which would be most helpful to others contemplating a similar course. A successful example of such a course developed by the authors is discussed in detail.
Low-noise parametric amplification at 35 GHz in a single Josephson tunnel junction

Parametric amplification at 35 GHz has been obtained using a single Josephson tunnel junction as the active element. The amplifier was operated in the singly quasidegenerate mode with a pump frequency at 70 GHz. The noise temperature was measured and found correlated with the gain. At the highest gain achieved, 11.6 dB, the noise temperature was 400 K. The noise temperature was reduced considerably by decreasing the gain. At 8 and 4 dB we found 165±25 K and 50±30 K, respectively. Applied Physics Letters is copyrighted by The American Institute of Physics.
Parametric amplification on rf-induced steps in a Josephson tunnel junction

Parametric effects including amplification in a singly degenerate mode have been observed in Josephson tunnel junctions at dc bias points on rf-induced steps. Net gain at 9 GHz was achieved with a bias on the fundamental 18-GHz step and subharmonic self-oscillations were seen on 18 and 70-GHz rf-induced steps even at voltages approaching the energy gap. A qualitative explanation of the results is presented. Journal of Applied Physics is copyrighted by The American Institute of Physics.

General information
State: Published
Organisations: Department of Physics, Quantum Physics and Information Technology, Technical University of Denmark
Authors: Sørensen, O. (Ekstern), Pedersen, N. F. (Intern), Mygind, J. (Intern), Dueholm, B. (Ekstern)
Pages: 2988-2990
Publication date: 1979
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Applied Physics
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BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.72 SJR 0.632 SNIP 0.815
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.618 SNIP 0.84 CiteScore 1.57
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.005 SNIP 1.18 CiteScore 2.04
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.165 SNIP 1.317 CiteScore 2.24
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.305 SNIP 1.294 CiteScore 2.13
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.373 SNIP 1.318 CiteScore 2.24
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.47 SNIP 1.195
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.518 SNIP 1.238
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.667 SNIP 1.338
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.708 SNIP 1.395
Web of Science (2007): Indexed yes
Nonresonant detection of the Josephson radiation 35 GHz from a superconducting thin-film microbridge is reported. The high frequency and the accuracy of these measurements lead to a new important observation: subharmonic energy gap structure in the detected integral power. The maximum integral power measured was as large as $8 \times 10^{-11}$ W. Applied Physics Letters is copyrighted by The American Institute of Physics.

**Subharmonic energy gap structure in the Josephson radiation at 35 GHz from a superconducting thin-film microbridge**

Nonresonant detection of the Josephson radiation 35 GHz from a superconducting thin-film microbridge is reported. The high frequency and the accuracy of these measurements lead to a new important observation: subharmonic energy gap structure in the detected integral power. The maximum integral power measured was as large as $8 \times 10^{-11}$ W. Applied Physics Letters is copyrighted by The American Institute of Physics.
Microwave parametric amplifiers using externally pumped Josephson junctions
Externally pumped parametric amplifiers are discussed. Theory and experiments on the singly degenerate parametric amplifier based on a Josephson junction are presented. Advantages and limitations of the singly degenerate and doubly degenerate parametric amplifiers are discussed. Some plans and proposals for future research are presented.

General information
State: Published
Organisations: Biophysics and Fluids, Department of Physics, Technical University of Denmark
Authors: Sørensen, O. H. (Ekstern), Mygind, J. (Intern), Pedersen, N. F. (Intern)
Pages: 246-253
Publication date: 1978
Main Research Area: Technical/natural sciences

Publication information
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Volume: 44
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Ratings:
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BFI (2017): BFI-level 1
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 0.21 SJR 0.163 SNIP 0.236
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.179 SNIP 0.217 CiteScore 0.18
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.165 SNIP 0.191 CiteScore 0.17
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.16 SNIP 0.173 CiteScore 0.16
ISI indexed (2013): ISI indexed no
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.17 SNIP 0.176 CiteScore 0.14
ISI indexed (2012): ISI indexed no
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.153 SNIP 0.141 CiteScore 0.12
ISI indexed (2011): ISI indexed no
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.16 SNIP 0.144
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.157 SNIP 0.137
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.162 SNIP 0.112
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.157 SNIP 0.125
Scopus rating (2006): SJR 0.157 SNIP 0.121
Scopus rating (2005): SJR 0.157 SNIP 0.187
Scopus rating (2004): SJR 0.122 SNIP 0
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 0.416 SNIP 0.765
Scopus rating (2002): SJR 2.677 SNIP 1.594
Web of Science (2001): Indexed yes
Original language: English
DOIs:
Temperature dependence of the cosφ conductance in Josephson tunnel junctions determined from plasma resonance experiments

The microwave response at 9 GHz of Sn-O-Sn tunnel-junction current biased at zero dc voltage has been measured just below the critical temperature $T_c$ of the Sn films. The temperature dependence of the cosφ conductance is determined from the resonant response at the junction plasma frequency $f_p$ as the temperature is decreased from $T_c$. We used three different schemes for observation of the plasma oscillations: (a) second-harmonic generation (excitation at $\sim 4.5$ GHz, $f_p\sim4.5$ GHz); (b) mixing (excitations at $\sim 9$ and $\sim 18$ GHz, $f_p\sim9$ GHz); (c) parametric half-harmonic oscillation (excitation at $\sim 18$ GHz, $f_p\sim9$ GHz). Measurements were possible in two temperature intervals, $0.994\leq T / T_c\leq0.982$ and $0.965\geq T / T_c\geq0.930$, with the result that as the temperature was decreased, the cosφ amplitude first increased from about zero to positive values and then at lower temperatures decreased approaching -1 at the lowest temperatures of the experiment.

General information
State: Published
Organisations: Department of Physics, Biophysics and Fluids, Technical University of Denmark
Authors: Pedersen, N. F. (Intern), Sørensen, O. H. (Ekstern), Mygind, J. (Intern)
Pages: 3220-3230
Publication date: 1978
Main Research Area: Technical/natural sciences

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Journal: Physical Review B Condensed Matter
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Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.16
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.933 SNIP 0.94 CiteScore 2.8
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.667 SNIP 1.262 CiteScore 3.3
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.785 SNIP 1.339 CiteScore 3.55
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 3.206 SNIP 1.394 CiteScore 3.57
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 3.382 SNIP 1.438 CiteScore 3.61
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
X-band singly degenerate parametric amplification in a Josephson tunnel junction

Preliminary measurements on a (quasi-) degenerate parametric amplifier using a single Josephson tunnel junction as the active element is reported. The pump frequency is at 18 GHz and the signal and idler frequencies are both at about 9 GHz. A power gain of 16 dB in a 4-MHz 3-dB bandwidth is achieved at the top of the cryostat. Applied Physics Letters is copyrighted by The American Institute of Physics.
Measured Temperature Dependence of the \( \cos \phi \) Conductance in Josephson Tunnel Junctions

The temperature dependence of the \( \cos \phi \) conductance in Sn-O-Sn Josephson tunnel junctions has been measured just below the critical temperature, \( T_c \). From the resonant microwave response at the junction plasma frequency as the temperature is decreased from \( T_c \) it is deduced that the amplitude of the \( \cos \phi \) term first increases from near zero to positive values and only at \( T / T_c \approx 0.96 \) attains values of order-1.
Measurements of the active properties of a Dayem micro-bridge at X-band frequencies is described. The bridge was mounted in a microwave cavity designed to match the bridge properly and the microwave output from the cavity was detected using a sensitive X-band spectrometer. Microwave power was detected from the freely running Josephson oscillations with the bridge dc-biased to emit at the receiver frequency and the maximum power extracted was of order 10^-12W when the receiver was tuned to the cavity resonance. With an external rf-excitation of the bridge the amplitude of either the first or second harmonic response was measured. On the basis of analogue computer simulations an equivalent circuit was obtained describing the bridge coupled to the cavity. The large self inductance of the background film adjacent to the bridge was found to play a major role in explaining our results.
Nonresonant detection of Josephson radiation from thin-film microbridges

Measurements are reported of the Josephson radiation from microbridges coupled to an X-band receiver via a nonresonant microwave transformer. Although closely coupled to the bridge, the transformer does not modify the bridge properties. We find that near the transition temperature the radiation linewidth is proportional to the square of the dynamic resistance, which is also predicted by the resistively shunted junction model. The effective noise temperature determined by the linewidth is $19\pm3$ K and the measured maximum integral power is $5\times10^{-12}$ W. Journal of Applied Physics is copyrighted by The American Institute of Physics.

General information
State: Published
Organisations: Quantum Physics and Information Technology, Department of Physics, Technical University of Denmark, Russian Academy of Sciences
Authors: Sørensen, O. H. (Ekstern), Mygind, J. (Intern), Pedersen, N. F. (Intern), Gubankov, V. N. (Ekstern), Levinsen, M. T. (Ekstern), Lindelof, P. E. (Intern)
Pages: 5372-5374
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Main Research Area: Technical/natural sciences

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BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.72 SJR 0.632 SNIP 0.815
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.618 SNIP 0.84 CiteScore 1.57
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.005 SNIP 1.18 CiteScore 2.04
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.165 SNIP 1.317 CiteScore 2.24
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.305 SNIP 1.294 CiteScore 2.13
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.373 SNIP 1.318 CiteScore 2.24
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.47 SNIP 1.195
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.518 SNIP 1.238
The shunted-Josephson-junction model with a monochromatic ac current drive is discussed employing the qualitative methods of the theory of nonlinear oscillations. As in the preceding paper dealing with the autonomous junction, the model includes a phase-dependent conductance and a shunt capacitance. The mathematical discussion makes use of the phase-space representation of the solutions to the differential equation. The behavior of the trajectories in phase space is described for different characteristic regions in parameter space and the associated features of the junction IV curve to be expected are pointed out. The main objective is to provide a qualitative understanding of the junction behavior, to clarify which kinds of properties may be derived from the shunted-junction model, and to specify the relative arrangement of the important domains in the parameter-space decomposition.
Shunted-Josephson-junction model. I. The autonomous case

The shunted-Josephson-junction model: the parallel combination of a capacitance, a phase-dependent conductance, and an ideal junction element biased by a constant current, is discussed for arbitrary values of the junction parameters. The main objective is to provide a qualitative understanding of the junction behavior in different regions of the parameter space. Approximate formulas are given for the parameter-space decomposition into regions of qualitatively different junction behavior corroborated by the associated-phase plane portraits and also approximate expressions for the corresponding dc current-voltage curves are presented. The case with a time-dependent monochromatic bias current is treated in a similar fashion in the companion paper.
The compound pendulum in intermediate laboratories and demonstrations

A student laboratory course on the motion of the compound pendulum is described. The course is suited for physics and engineering students in their first year and requires a background in mechanics and mathematics corresponding to a one-semester course in these disciplines. The purpose of this course is to present a system to the students which can be approached experimentally and to some extent theoretically using elementary methods, and hence allow the students to practice their newly acquired knowledge. All the experimental results presented here are obtained by the students using a simple and readily fabricated version of the compound pendulum.
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.548 SNIP 1.084 CiteScore 0.77
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.644 SNIP 1.458 CiteScore 0.78
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.66 SNIP 1.353 CiteScore 0.93
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.615 SNIP 1.218 CiteScore 0.77
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.719 SNIP 1.271 CiteScore 0.73
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.624 SNIP 1.139 CiteScore 0.71
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.481 SNIP 1.323
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.582 SNIP 1.312
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.674 SNIP 1.215
Scopus rating (2007): SJR 0.764 SNIP 1.279
Scopus rating (2006): SJR 0.725 SNIP 1.131
Scopus rating (2005): SJR 0.725 SNIP 1.261
Scopus rating (2004): SJR 0.521 SNIP 1.435
Scopus rating (2003): SJR 0.375 SNIP 1.191
Scopus rating (2002): SJR 0.596 SNIP 0.956
Scopus rating (2001): SJR 0.452 SNIP 1.044
Scopus rating (2000): SJR 0.594 SNIP 1.016
Scopus rating (1999): SJR 0.839 SNIP 1.193
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Publication: Research - peer-review › Journal article – Annual report year: 1977

Direct detection of the Josephson radiation emitted from superconducting thin-film microbridges
We report direct measurements of the Josephson radiation emitted in x band from a superconducting thin-film microbridge coupled to a resonance cavity. Power is emitted if one of the harmonics of the Josephson frequency is in the bandwidth of the receiver. The maximum power emitted during our experiment was 10−13 W. The Josephson radiation could easily be detected at frequencies off resonance. Applied Physics Letters is copyrighted by The American Institute of Physics.

General information
State: Published
Organisations: Department of Physics, Biophysics and Fluids, Technical University of Denmark, University of Copenhagen
Authors: Pedersen, N. F. (Intern), Sørensen, O. H. (Ekstern), Mygind, J. (Intern), Lindelof, P. E. (Intern), Levinsen, M. T. (Ekstern), Clark, T. D. (Ekstern)
Direct detection of the parametrically generated half-harmonic voltage in a Josephson tunnel junction

The first direct observation of the parametrically generated half-harmonic voltage in a Josephson tunnel junction is reported. A microwave signal at f=17.25 GHz is applied to the junction dc current biased at zero voltage such that the Josephson plasma resonance fp=f/2. Under these conditions a large-amplitude microwave signal is emitted at fp provided the input power exceeds a threshold value. The results are compared to existing theory. Applied Physics Letters is copyrighted by The American Institute of Physics.
A new parametric mode in a Josephson tunnel junction biased in the zero-voltage mode is suggested. It is a nondegenerate parametric excitation where the junction plasma resonance represents the input circuit, and a junction geometrical resonance represents the idler circuit. This nondegenerate mode has been observed in analog experiments. In a real junction the realization of this mode of operation depends on the coupling between the plasma resonance and the geometrical resonance, and it is argued that without an external dc magnetic field the even geometrical resonances are most favorable for such a coupling. Journal of Applied Physics is copyrighted by The American Institute of Physics.
Experimental investigation on parametric excitation of plasma oscillations in Josephson tunnel junctions

Experimental evidence for subharmonic, parametric excitation of plasma oscillations in Josephson tunnel junctions is presented. The experiments described are performed by measuring the microwave power necessary to switch a Josephson tunnel junction biased in the zero voltage state to a finite voltage state.

General information

State: Published
Organisations: Department of Physics
Authors: Bak, C. K. (Intern), Kofoed, B. (Intern), Pedersen, N. F. (Intern), Særmark, K. (Intern)
Pages: 829-833
Publication date: 1975
Main Research Area: Technical/natural sciences

Publication information

Journal: IEEE Transactions on Magnetics
Volume: 11
Issue number: 2
ISSN (Print): 0018-9464
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.48 SNIP 0.915 CiteScore 1.47
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.565 SNIP 1.207 CiteScore 1.77
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.715 SNIP 1.491 CiteScore 1.68
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.608 SNIP 1.424 CiteScore 1.75
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.788 SNIP 1.574 CiteScore 1.89
Experimental evidence for subharmonic parametric excitation of plasma oscillations in Josephson tunnel junctions is presented. The experiments described are performed by measuring the microwave power necessary to switch a Josephson–tunnel junction biased in the zero–voltage state to a finite–voltage state. Journal of Applied Physics is copyrighted by The American Institute of Physics.

**General information**
State: Published
Organisations: Department of Physics
Authors: Bak, C. K. (Intern), Kofoed, B. (Intern), Pedersen, N. F. (Intern), Særmark, K. (Intern)
Pages: 886-889
Publication date: 1975
Main Research Area: Technical/natural sciences

**Publication information**
Journal: Journal of Applied Physics
Volume: 46
Issue number: 2
ISSN (Print): 0021-8979
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Microwave dependence of subharmonic gap structure in superconducting junctions

Experiments on both point-contact junctions (Nb-Nb) and on small area thin-film tunnel junctions (Sn-O-Sn) show that applied 4-mm radiation produces satellites associated with "subharmonic" gap structure as well as the familiar microwave-assisted tunneling structure associated with the superconducting energy gap itself. The location in voltage of all these structures is given by $eV=(2\Delta±nh\nu)/m$, where $2\Delta$ is the superconducting energy gap, $\nu$ is the applied frequency, $h$ is Planck's constant, $e$ is the magnitude of the electronic charge, $V$ is the dc voltage drop across the junction, and $m$ and $n$ are integers: $m=1,2,3,…$ and $n=0,1,2,…$. The power dependence of the satellite structure and the microwave-assisted tunneling structure is consistent for all junctions tested with the expression $Jn^2(m e Vrf / h \nu)$, where $Jn(x)$ is the ordinary Bessel function of order $n$, $Vrf$ is the amplitude of the induced microwave voltage drop across the junction, and the other quantities are as defined above. A distinction between the explanations—multiparticle tunneling and nonlinear self-coupling—of the subharmonic gap structure cannot, however, be made on the basis of the observed power dependence. Hence other properties such as relative amplitude and line shape are considered and it is concluded that self-coupling mechanisms seem able to account for all the observations, whereas multiparticle tunneling may be discarded as the sole explanation of the structure.
A close analogy exists between a Josephson junction and a phase-locked loop. A new type of electrical analog based on this principle is presented. It is shown that the inclusion in this analog of a low-pass filter gives rise to a current of the same form as the Josephson quasiparticle-pair current. A simple picture of the quasiparticle-pair current, which gives the right dependences, is obtained by assuming a junction cutoff frequency to be at the energy gap. ©1973 American Institute of Physics
Parametric excitation of plasma oscillations in Josephson Junctions

A theory is presented for parametric excitation of plasma oscillations in a Josephson junction biased in the zero voltage mode. A threshold curve for the onset of the parametric excitation is deduced via the stability properties of a Mathieu differential equation obtained by a self-consistent linearization procedure. The important parameters turn out to be the plasma frequency and the circuit losses. The results of the calculation are compared with the experiments performed on a Josephson junction analog and good agreement is obtained. It is suggested that the effect should be observable in tunnel junctions, but perhaps less likely in point contacts. ©1973 American Institute of Physics.
Study of the geometrical resonances of superconducting tunnel junctions

The resonant cavity structure of superconducting Sn-Sn-oxide-Sn tunnel junctions has been investigated via photon-assisted quasiparticle tunneling. We find that the temperature-dependent losses at 35 GHz are determined by the surface resistance of the Sn films for reduced temperatures between 0.5 and 0.8. Our results are in very good agreement with the microscopic theory of Mattis and Bardeen for the surface resistance of Sn. ©1973 American Institute of Physics
Magnetic Field Dependence and Q of the Josephson Plasma Resonance

The results of an experimental study of the magnetic field dependence of the Josephson-plasma-resonance frequency and linewidth in Pb-Pb oxide-Pb tunnel junctions are reported. In the presence of an external magnetic field, the plasma mode is found to be sensitive to an antisymmetric component of supercurrent density which is not observed in conventional measurements of the field-dependent critical current. The frequency and field dependence of the plasma-resonance linewidth are interpreted as evidence that the previously unobserved quasiparticle-pair-interference tunnel current predicted by Josephson exists and has the expected magnitude but the opposite sign.
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 3.417 SNIP 1.451
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 3.109 SNIP 1.474
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 2.982 SNIP 1.524
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 2.923 SNIP 1.546
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 2.796 SNIP 1.56
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 2.763 SNIP 1.607
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 2.742 SNIP 1.606
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 2.75 SNIP 1.536
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 2.788 SNIP 1.706
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 2.946 SNIP 1.635
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 2.986 SNIP 1.631
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 3.115 SNIP 1.58
Original language: English
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Links:

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Source: orbit
Source-ID: 248482
Publication: Research - peer-review › Journal article – Annual report year: 1972

Projects:

Computation of Superconducting Wind Turbine Generators
Department of Mathematics
Period: 15/12/2008 → 24/05/2012
Number of participants: 8
Phd Student:
Rodríguez Zermeno, Victor Manuel (Intern)
Supervisor:
Anbarasu, Ramasamy (Ekstern)
Kjær, Philip Carne (Ekstern)
Pedersen, Niels Falsig (Intern)
Main Supervisor:
Sørensen, 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

Fluxdynamik i Højtemperatur Superleder
Department of Electrical Engineering
Period: 01/01/2003 → 28/04/2006
Number of participants: 7
Phd Student:
Madsen, Søren Peder (Intern)
Supervisor:
Tønnesen, Ole (Intern)
Christiansen, Peter Leth (Intern)
Main Supervisor:
Pedersen, Niels Falsig (Intern)
Examiner:
Sørensen, Mads Peter (Intern)
Hedegård, Per (Ekstern)
Ustinov, Alexey V. (Ekstern)

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

EUCAS 2001 Conference - Copenhagen

Department of Electric Power Engineering
Department of Physics
DIS Congress Service
Nordic Superconductor Technology
Period: 01/08/1999 → 01/11/2001
Number of participants: 13
Project participant:
Hald, Britta (Intern)
Herse, Erik (Intern)
Hvirgeltoft, Georg (Intern)
Jensen, Kim Høj (Intern)
Larsen, Esben (Intern)
Leisner, Torben (Intern)
Pedersen, Niels Falsig (Intern)
Træholt, Chresten (Intern)
Däumling (fratrådt), Manfred (Intern)
Mygind, Jesper (Intern)
Jacobsen, Claus Schelde (Intern)
Renouf, Sophie (Ekstern)
**Project Manager, organisational:**
Tønnesen, Ole (Intern)

**Financing sources**
Source: Unknown
Name of research programme: Ukendt
Amount: 3,000,000.00 Danish Kroner

**Project**

**Transient analyse af superledende kabler**
Department of Electrical Engineering
Period: 01/06/1999 → ...
Number of participants: 7
Phd Student:
Jensen, Kim Høj (Intern)
Supervisor:
Däumling (fratrådt), Manfred (Intern)
Lomholt, Karin (Ekstern)
Main Supervisor:
Tønnesen, Ole (Intern)
Examiner:
Pedersen, Niels Falsig (Intern)
Hansen, Jørn Otto Bindslev (Ekstern)
Hörnfeldt, Sven P. (Ekstern)

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

**Superconducting elements and nonlinearity**

Department of Informatics and Mathematical Modeling
Department of Mathematics

**Project participant:**
Sørensen, Mads Peter (Intern)
Scott, Alwyn C. (Intern)
Caputo, Jean Guy (Intern)
Flytzanis, N. (Ekstern)
Kalosakas, G. (Ekstern)
Lazarides, Nikos (Ekstern)
Petraglia, Antonio (Ekstern)
Maksimov, A. G. (Ekstern)
Benabdallah, A. (Ekstern)
Troville, L. (Ekstern)
Lorenzo, J. Ph. (Ekstern)
Seidel, P. (Ekstern)
Mygind, Jesper (Intern)
Pedersen, Niels Falsig (Intern)
Intrinsic and stacked Josephson junctions
Research has been carried out in order to clarify the complicated dynamics taking place in intrinsic Josephson junctions of the type BSCCO. Model equations have been set up and numerical simulations performed. Experiments on low Tc model systems as well as single crystal BSCCO samples have been performed. An invited lecture at the M2SHTSC conference in Beijing summarised some of the main results obtained.

Department of Physics
Period: 01/01/1996 → 31/12/1996
Number of participants: 5
Project participant:
Sakai, Shigeki (Ekstern)
Muller, Paul (Ekstern)
Ustinov, Alexey (Ekstern)
Cirillo, Matteo (Ekstern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 100,000.00 Danish Kroner
Source: Unknown
Name of research programme: Ukendt
Amount: 100,000.00 Danish Kroner
Source: Unknown
Name of research programme: Ukendt
Amount: 100,000.00 Danish Kroner
Source: Unknown
Name of research programme: Ukendt
Amount: 100,000.00 Danish Kroner

Nonlinear properties of long Josephson junctions
Soliton dynamics of long Josephson junctions has been investigated. The role of geometrical and temperature gradients has been investigated in detail. The analytical results have been compared with experiments on superconducting structures with different geometries.

Department of Physics
Period: 01/01/1996 → 31/12/1996
Number of participants: 1
Integrated High Critical Temperature Superconducting Components
The aim of this project is to investigate the potential of Rapid Single Flux Quantum (RSFQ) elements for high frequency electronics and the properties of the devices. Using flux quantization in Superconducting QUantum Interference Devices (SQUIDs) the magnetic flux quanta can be used as the units of digital information. Combining SQUIDs in an appropriate manner one can built digital logical circuits. The goal is to investigate the properties of some logical circuits made of high-Tc superconductors.

Department of Physics
NKT Research Center Ltd.
Period: 01/07/1995 → 31/12/1998
Number of participants: 4
Project participant:
Mygind, Jesper (Intern)
Pedersen, Niels Falsig (Intern)
Jacobsen, Claus Schelde (Intern)
Project Manager, organisational:
Fischer, Gerd Michael (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 600,000.00 Danish Kroner
Project

Simulation studies of fluxon dynamics in long
Technical University of Denmark
Period: 01/09/1993 → 24/10/1996
Number of participants: 3
Phd Student:
Petraglia, Antonio (Intern)
Main Supervisor:
Pedersen, Niels Falsig (Intern)
Examiner:
Samuelsen, Mogens Rugholm (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Ef-Finansieret, Stipen.-SU
Project: PhD