

American Mathematical Society

# TRANSLATIONS

Series 2 • Volume 153

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## Singularity Theory and Some Problems of Functional Analysis



American Mathematical Society

# Singularity Theory And Some Problems Of Functional Analysis

**R. L. Dobrushin**



## **Singularity Theory And Some Problems Of Functional Analysis:**

**Singularity Theory and Some Problems of Functional Analysis**, 1992      **Singularity Theory and Some Problems of Functional Analysis** Semen Grigor'evich Gindikin, 1992 The emergence of singularity theory marks the return of mathematics to the study of the simplest analytical objects functions graphs curves surfaces The modern singularity theory for smooth mappings which is currently undergoing intensive developments can be thought of as a crossroad where the most abstract topics such as algebraic and differential geometry and topology complex analysis invariant theory and Lie group theory meet the most applied topics such as dynamical systems mathematical physics geometrical optics mathematical economics and control theory The papers in this volume include reviews of established areas as well as presentations of recent results in singularity theory The authors have paid special attention to examples and discussion of results rather than burying the ideas in formalism notation and technical details The aim is to introduce all mathematicians as well as physicists engineers and other consumers of singularity theory to the world of ideas and methods in this burgeoning area

Dynamical Systems in Classical Mechanics Valerii Viktorovich Kozlov, 1995 This book shows that the phenomenon of integrability is related not only to Hamiltonian systems but also to a wider variety of systems having invariant measures that often arise in nonholonomic mechanics Each paper presents unique ideas and original approaches to various mathematical problems related to integrability stability and chaos in classical dynamics Topics include the inverse Lyapunov theorem on stability of equilibria geometrical aspects of Hamiltonian mechanics from a hydrodynamic perspective current unsolved problems in the dynamical systems approach to classical mechanics      **Proceedings of the St. Petersburg Mathematical Society, Volume VIII** N.N. Uraltseva, 2002-04-02 The articles in this collection present new results in partial differential equations numerical analysis probability theory and geometry The results ideas and methods given in the book will be of interest to a broad range of specialists      *Lie Groups and Lie Algebras: E. B. Dynkin's Seminar* Semen Grigor'evich

Gindikin, Ernest Borisovich Vinberg, 1995 In celebration of E B Dynkin's 70th birthday this book presents current papers by those who participated in Dynkin's seminar on Lie groups and Lie algebras in the late 1950s and early 1960s Dynkin had a major influence not only on mathematics but also on the students who attended his seminar many of whom are today's leading mathematicians in Russia and in the U S Dynkin's contributions to the theory of Lie groups is well known and the survey paper by Karpelevich Onishchik and Vinberg allows readers to gain a deeper understanding of this work Features several aspects of modern developo      Topics in Topology and Mathematical Physics Sergei Petrovich Novikov, 1995

Singular Perturbations Elena Shchepakina, Vladimir Sobolev, Michael P. Mortell, 2014-10-06 These lecture notes provide a fresh approach to investigating singularly perturbed systems using asymptotic and geometrical techniques It gives many examples and step by step techniques which will help beginners move to a more advanced level Singularly perturbed systems appear naturally in the modelling of many processes that are characterized by slow and fast motions simultaneously for

example in fluid dynamics and nonlinear mechanics This book's approach consists in separating out the slow motions of the system under investigation The result is a reduced differential system of lesser order However it inherits the essential elements of the qualitative behaviour of the original system Singular Perturbations differs from other literature on the subject due to its methods and wide range of applications It is a valuable reference for specialists in the areas of applied mathematics engineering physics biology as well as advanced undergraduates for the earlier parts of the book and graduate students for the later chapters **Topology of real algebraic varieties and related topics** V. Kharlamov,1996

Mathematics in St. Petersburg A. A. Bolibrukh,1996 **Sinai's Moscow Seminar on Dynamical Systems** L. A. Bunimovich,B. M. Gurevich,Ya. B. Pesin,1996 Topics in Statistical and Theoretical Physics R. L. Dobrushin,1996

*Singular Perturbations and Hysteresis* Michael P. Mortell,Robert E. O'Malley,Alexei Pokrovskii,Vladimir Sobolev,2005-06-01 This book unifies many important recent developments in the analysis of singular perturbation and hysteresis phenomena in an accessible and comprehensive fashion In April 2002 at University College Cork in Ireland the editors conducted a workshop to provide a forum for experts to share their interests and knowledge For this book the editors have compiled research from those practitioners in areas such as reacting systems semiconductor lasers shock phenomena in economic modeling and fluid mechanics all with an emphasis on hysteresis and singular perturbations A basic introduction to hysteresis and singular perturbation theory is included with simple examples from both physics and mathematics Later chapters address applications of hysteresis to economics various aspects of the asymptotic theory of singularly perturbed systems typical problems of the asymptotic theory of contrast structures and the geometrical approach to an investigation of models with singular perturbations and hysteresis Complements of Discriminants of Smooth Maps V. A. Vasil'ev,1994 Up

to date reference on this exciting area of mathematics Discusses the wide range of applications in topology algebraic geometry and catastrophe theory Model Reduction and Coarse-Graining Approaches for Multiscale Phenomena Alexander N. Gorban,Nikolas Kazantzis,I. G. Kevrekidis,Hans Christian Öttinger,Konstantinos Theodoropoulos,2006-09-22 Model reduction and coarse graining are important in many areas of science and engineering How does a system with many degrees of freedom become one with fewer How can a reversible micro description be adapted to the dissipative macroscopic model These crucial questions as well as many other related problems are discussed in this book All contributions are by experts whose specialities span a wide range of fields within science and engineering *Topological Field Theory, Primitive Forms and Related Topics* A. Kashiwara,A. Matsuo,K. Saito,I. Satake,2012-12-06 As the interaction of mathematics and theoretical physics continues to intensify the theories developed in mathematics are being applied to physics and conversely This book centers around the theory of primitive forms which currently plays an active and key role in topological field theory theoretical physics but was originally developed as a mathematical notion to define a good period mapping for a family of analytic structures The invited papers in this volume are expository in nature by participants of the Taniguchi Symposium on

Topological Field Theory Primitive Forms and Related Topics and the RIMS Symposium bearing the same title both held in Kyoto The papers reflect the broad research of some of the world's leading mathematical physicists and should serve as an excellent resource for researchers as well as graduate students of both disciplines

**Topological Field Theory, Primitive Forms and Related Topics** Masaki Kashiwara, 1998-12 As the interaction of mathematics and theoretical physics continues to intensify the theories developed in mathematics are being applied to physics and conversely This book centers around the theory of primitive forms which currently plays an active and key role in topological field theory theoretical physics but was originally developed as a mathematical notion to define a good period mapping for a family of analytic structures The invited papers in this volume are expository in nature by participants of the Taniguchi Symposium on Topological Field Theory Primitive Forms and Related Topics and the RIMS Symposium bearing the same title both held in Kyoto The papers reflect the broad research of some of the world's leading mathematical physicists and should serve as an excellent resource for researchers as well as graduate students of both disciplines

**Genericity In Polynomial Optimization** Tien Son Pham, Ha Huy Vui, 2016-12-22 In full generality minimizing a polynomial function over a closed semi algebraic set requires complex mathematical equations This book explains recent developments from singularity theory and semi algebraic geometry for studying polynomial optimization problems Classes of generic problems are defined in a simple and elegant manner by using only the two basic and relatively simple notions of Newton polyhedron and non degeneracy conditions associated with a given polynomial optimization problem These conditions are well known in singularity theory however they are rarely considered within the optimization community Explanations focus on critical points and tangencies of polynomial optimization Hlderian error bounds for polynomial systems Frank Wolfe type theorem for polynomial programs and well posedness in polynomial optimization It then goes on to look at optimization for the different types of polynomials Through this text graduate students PhD students and researchers of mathematics will be provided with the knowledge necessary to use semi algebraic geometry in optimization

**Progress in Industrial Mathematics at ECMI 2004** Alessandro Di Bucchianico, Robert M.M. Mattheij, Marc Adriaan Peletier, 2006-01-09 ECMI has a brand name in Industrial Mathematics and organises successful biannual conferences This time the conference on Industrial Mathematics held in Eindhoven in June 2004 Mathematics focused on Aerospace Electronic Industry Chemical Technology Life Sciences Materials Geophysics Financial Mathematics and Water flow The majority of the invited talks on these topics can be found in these proceedings Apart from these lectures a large number of contributed papers and minisymposium papers are included here They give an interesting and impressive overview of the important place mathematics has achieved in solving all kinds of problems met in industry and commerce in particular

**Droplets and Sprays** Sergei Sazhin, 2014-05-19 Providing a clear and systematic description of droplets and spray dynamic models this book maximises reader insight into the underlying physics of the processes involved outlines the development of new physical and mathematical models and broadens understanding of

interactions between the complex physical processes which take place in sprays Complementing approaches based on the direct application of computational fluid dynamics CFD Droplets and Sprays treats both theoretical and practical aspects of internal combustion engine process such as the direct injection of liquid fuel subcritical heating and evaporation Including case studies that illustrate the approaches relevance to automotive applications it is also anticipated that the described models can find use in other areas such as in medicine and environmental science

**Droplets and Sprays: Simple Models of Complex Processes** Sergei S. Sazhin, 2022-06-28 This book acts as a guide to simple models that describe some of the complex fluid dynamics heat mass transfer and combustion processes in droplets and sprays Attention is focused mainly on the use of classical hydrodynamics and a combination of kinetic and hydrodynamic models to analyse the heating and evaporation of mono and multi component droplets The models were developed for cases when small and large numbers of components are present in droplets Some of these models are used for the prediction of time to puffing micro explosion of composite water fuel droplets processes that are widely used in combustion devices to stimulate disintegration of relatively large droplets into smaller ones The predictions of numerical codes based on these models are validated against experimental results where possible In most of the models droplets are assumed to be spherical some preliminary results of the generalisation of these models to the case of non spherical droplets approximating them as spheroids are presented

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