Introduction to Compactness Results in Symplectic Field Theory

The book grew out of lectures given by the author in 2005. Symplectic field theory is a new important subject which is currently being developed. The starting point of this theory are compactness results for holomorphic curves established in 2004. The book gives a systematic introduction providing a lot of background material much of which is scattered throughout the literature. The aim is to provide an entry point into symplectic field theory for non-specialists and for graduate students. In addition, the book provides extensions of certain compactness results which are believed to be true by the specialists but which have not yet been published in the literature in detail.

Features
- Systematic introduction into compactness results for holomorphic curves
- Entry point into symplectic field theory for non-specialists and students
- Extensions to some compactness results not yet published

Fields of interest
Differential Geometry; Manifolds and Cell Complexes (incl. Diff.Topology)

Target groups
Research

Product category
Monograph

Combinatory Analysis
Dedicated to George Andrews

Contents
D. Bakry, Université Paul Sabatier, Toulouse, France; I. Gentil, Université Claude Bernard Lyon 1, Villeurbanne, France; M. Ledoux, Université Paul Sabatier, Toulouse, France

**Analysis and Geometry of Markov Diffusion Operators**

The present volume is an extensive monograph on the analytic and geometric aspects of Markov diffusion operators.

**Features**
- First book to give systematic account of the rich interplay between analytic, probabilistic and geometric aspects of Markov diffusion operators
- Authors are leading players in the field
- Covers large body of results and techniques from the early developments to the current achievements

**Contents**

**Fields of interest**
Probability Theory and Stochastic Processes; Analysis; Differential Geometry

**Target groups**
Research

**Product category**
Monograph

Due September 2013

2013. Approx. 490 p. (Grundlehren der mathematischen Wissenschaften, Volume 348) Hardcover
- *€ (D) 101,64 | € (A) 104,49 | sFr 126,50
- approx. *€ 94,99 | £85.50
ISBN 978-3-319-00226-2

J. Baldeaux, E. Platen, University of Technology Sydney, Haymarket, NSW, Australia

**Functionalities of Multidimensional Diffusions with Applications to Finance**

**Features**
- Provides the reader in a systematic way with the ability to derive explicit formulas for functionalities of multidimensional diffusions
- Special unique chapters on Lie symmetry group methods and matrix valued Wishart processes
- Provides the most recent introduction to the benchmark approach to finance pioneered by Platen and co-authors
- The reader finds readily applicable exact simulation methods for various multidimensional diffusion processes

**Contents**

**Fields of interest**
Quantitative Finance; Financial Economics; Applications of Mathematics

**Target groups**
Research

**Product category**
Monograph

Due September 2013

- *€ (D) 101,64 | € (A) 104,49 | sFr 126,50
- € 94,99 | £85.50
ISBN 978-3-319-00746-5

L. Barreira, Universidade Técnica de Lisboa, Portugal

**Dimension Theory of Hyperbolic Flows**

The dimension theory of dynamical systems has progressively developed, especially over the last two decades, into an independent and extremely active field of research. Its main aim is to study the complexity of sets and measures that are invariant under the dynamics. In particular, it is essential to characterizing chaotic strange attractors. To date, some parts of the theory have either only been outlined, because they can be reduced to the case of maps, or are too technical for a wider audience. In this respect, the present monograph is intended to provide a comprehensive guide. Moreover, the text is self-contained and with the exception of some basic results in Chapters 3 and 4, all the results in the book include detailed proofs. The book is intended for researchers and graduate students specializing in dynamical systems who wish to have a sufficiently comprehensive view of the theory together with a working knowledge of its main techniques.

**Features**
- First comprehensive exposition of dimension theory of hyperbolic flows
- Includes an overview of dimension theory and multifractal analysis
- Includes a detailed discussion of major open problems in the area

**Contents**

**Fields of interest**
Dynamical Systems and Ergodic Theory; Analysis

**Target groups**
Research

**Product category**
Monograph

Due September 2013

2013. VIII, 160 p. (Springer Monographs in Mathematics) Hardcover
- *€ (D) 90,94 | € (A) 93,49 | sFr 113,50
- € 84,99 | £76.50
ISBN 978-3-319-00547-8

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**Fields of interest**
Dynamical Systems and Ergodic Theory; Analysis

**Target groups**
Research

**Product category**
Monograph

Due September 2013

2013. VIII, 160 p. (Springer Monographs in Mathematics) Hardcover
- *€ (D) 90,94 | € (A) 93,49 | sFr 113,50
- € 84,99 | £76.50
ISBN 978-3-319-00547-8
**An Operator Semigroup in Mathematical Genetics**

Lyapunov Equation Model of Drift and Mutation: Population Dependence and Asymptotic Behavior

Mutation and drift are two of the main genetic forces, which act on genes of individuals in populations. Their effects are influenced by population dynamics. This authored monograph presents a mathematical description of the time evolution of neutral genomic regions in terms of the differential Lyapunov equation. The qualitative behavior of its solutions, with respect to different mutation models and demographic patterns, can be characterized using operator semigroup theory.

This book covers the application to two mutation models: single step mutation for microsatellite loci and single-base substitutions. The effects of demographic change to the asymptotic of the distribution are also covered. The target audience primarily covers researchers and experts in the field but the book may also be beneficial for graduate students.

**Features**
- Combines genetic models with advanced mathematics
- Contains examples based on human evolution data
- Written by leading experts in the field

**Fields of interest**
- Genetics and Population Dynamics; Operator Theory; Biomedical Engineering

**Target groups**
- Research

**Product category**
- Monograph

**Due October 2013**

2014. 80 p. 20 illus. (SpringerBriefs in Applied Sciences and Technology / SpringerBriefs in Mathematical Methods) Softcover
- approx. € (D) 53,45 | € (A) 54,95 | sFr 66,50
- € 49,95 | £44.99
ISBN 978-3-642-35957-6

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**An Introduction to the Kähler-Ricci Flow**

This volume collects lecture notes from courses offered at several conferences and workshops, and provides the first exposition in book form of the basic theory of the Kähler-Ricci flow and its current state-of-the-art. While several excellent books on Kähler-Einstein geometry are available, there have been no such works on the Kähler-Ricci flow.

The book will serve as a valuable resource for graduate students and researchers in complex differential geometry, complex algebraic geometry and Riemannian geometry, and will hopefully foster further developments in this fascinating area of research. The Ricci flow was first introduced by R. Hamilton in the early 1980s, and is central in G. Perelman’s celebrated proof of the Poincaré conjecture.

**Features**
- An educational and up-to-date reference work on non-linear parabolic partial differential equations
- The only book currently available on the Kähler-Ricci flow
- The first book to present a complete proof of Perelman’s estimates for the Kähler-Ricci flow
- Illustrates the connection between the Kähler-Ricci flow and the Minimal Model Program

**Contents**
- The (real) theory of fully non linear parabolic equations.
- The KRF on positive Kodaira dimension K"ahler manifolds.
- The normalized K"ahler-Ricci flow on Fano manifolds.
- Bibliography.

**Fields of interest**
- Differential Geometry; Algebraic Topology; Several Complex Variables and Analytic Spaces

**Target groups**
- Research

**Product category**
- Monograph

**Due September 2013**

2013. Approx. 350 p. (Lecture Notes in Mathematics, Volume 2086) Softcover
- approx. € (D) 74,85 | € (A) 76,95 | sFr 93,50
- € 69,95 | £62.99
ISBN 978-3-319-00818-9

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**Selected Papers**

**Volume 3**

In recognition of professor Shiing-shen Chern’s long and distinguished service to mathematics and to the University of California, the geometers at Berkely held an International Symposium in Global Analysis and Global Geometry in his honor at Berkely in June 1979. The outgrowth of this Symposium was published in a series of three separate volumes, comprising approximately a third of Professor Chern’s total output up to 1979. Later, a fourth volume was published, comprising papers written during the Eighties. This third volume comprises papers written from 1965 until 1979. In making the selections, Professor Chern has given preference to shorter and less accessible papers.

**Fields of interest**
- Differential Geometry; Algebraic Topology; Several Complex Variables and Analytic Spaces

**Target groups**
- Research

**Product category**
- Monograph

**Due September 2013**

Only available in print

1989. XIV, 504 p. 2 illus. Softcover
- approx. € (D) 53,39 | € (A) 54,89 | sFr 66,50
- approx. € 49,90 | £44.99
ISBN 978-1-4614-4396-4

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**Features**
- An educational and up-to-date reference work on non-linear parabolic partial differential equations.
- The only book currently available on the Kähler-Ricci flow.
- The first book to present a complete proof of Perelman’s estimates for the Kähler-Ricci flow.
- Illustrates the connection between the Kähler-Ricci flow and the Minimal Model Program.

**Contents**
- The (real) theory of fully non linear parabolic equations.
- The KRF on positive Kodaira dimension Kähler manifolds.
- The normalized Kähler-Ricci flow on Fano manifolds.
- Bibliography.

**Fields of interest**
- Differential Geometry; Algebraic Topology; Several Complex Variables and Analytic Spaces.

**Target groups**
- Research.

**Product category**
- Monograph.

**Due September 2013**

- approx. € (D) 74,85 | € (A) 76,95 | sFr 93,50.
- € 69,95 | £62.99.

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- Bibliography.

**Fields of interest**
- Differential Geometry; Algebraic Topology; Several Complex Variables and Analytic Spaces.

**Target groups**
- Research.

**Product category**
- Monograph.

**Due September 2013**

Only available in print.

- approx. € (D) 53,39 | € (A) 54,89 | sFr 66,50.
- approx. € 49,90 | £44.99.
New Series
Mathematics Textbooks for Science and Engineering

Series editor: C. K. Chui

Textbooks in the series ‘Mathematics Textbooks for Science and Engineering’ will be aimed at the broad mathematics, science and engineering undergraduate and graduate levels, covering all areas of applied and applicable mathematics, interpreted in the broadest sense.

Fields of interest
Algebraic Geometry; Geometry; Differential Geometry

Target groups
Research

Product category
Monograph

Applied Mathematics
Data Compression, Spectral Methods, Fourier Analysis, Wavelets, and Applications

This textbook, apart from introducing the basic aspects of applied mathematics, focuses on recent topics such as information data manipulation, information coding, data approximation, data dimensionality reduction, data compression, time-frequency and time scale bases, image manipulation, and image noise removal. The methods treated in more detail include spectral representation and “frequency” of the data, providing valuable information for, e.g. data compression and noise removal. Furthermore, a special emphasis is also put on the concept of “wavelets” in connection with the “multi-scale” structure of data-sets.

Features
► A comprehensive Applied Mathematics Textbook on the theory and methods with the central theme of information data processing, manipulation, and compression ► Self-contained with minimum prerequisites from elementary linear algebra and calculus ► A Textbook for teaching at both undergraduate and beginning graduate levels ► Self-study for researchers in all disciplines of science and engineering

Contents
Linear Spaces.- Linear Analysis.- Spectral Methods and Applications.- Frequency-Domain Methods.- Data Compression.- Fourier Series.- Fourier Time-Frequency Methods.- Wavelet Transform and Filter Banks.- Compactly Supported Wavelets.- Wavelet Analysis.

Fields of interest
Applications of Mathematics; Information and Communication, Circuits; Statistics, general

Target groups
Graduate

Product category
Graduate/Advanced undergraduate textbook

Due September 2013

Only available in print

1978. XXI, 476 p. 2 illus. Softcover
► approx. *€ (D) 53,45 | € (A) 54,95 | sFr 66,50
► approx. € 49,95 | £44.99

C. K. Chui, Stanford University, Menlo Park, CA, USA;
Q. Jiang, University of Missouri, St. Louis, MO, USA

Due July 2013

2013. IX, 568 p. 63 illus., 36 in color. (Mathematics Textbooks for Science and Engineering, Volume 2)
Hardcover
► * € (D) 74,89 | € (A) 76,99 | sFr 93,50
► € 69,99 | £62.99
ISBN 978-94-6239-008-9


P. Dai Pra, Università degli Studi di Padova, Italy;
F. Caravenna, Università degli Studi di Milano-Bicocca, Italy

Probabilità

Un'introduzione attraverso modelli e applicazioni

Il presente volume intende fornire un'introduzione alla probabilità e alle sue applicazioni, senza fare ricorso alla teoria della misura, per studenti dei corsi di laurea scientifici (in particolare modo di matematica, fisica e ingegneria). Viene dedicato ampio spazio alla probabilità discreta, vale a dire su spazi finiti o numerabili. In questo contesto sono sufficienti pochi strumenti analitici per presentare la teoria in modo completo e rigoroso. L'esposizione è arricchita dall'analisi dettagliata di diversi modelli, di facile formulazione e allo stesso tempo di grande rilevanza teorica e applicativa, alcuni tuttora oggetto di ricerca.

Features

► Il libro presenta sin dall'inizio esempi significativi, trattati con strumenti elementari ma non banali, legati a problematiche di ricerca corrente ► Ampia gamma di esercizi con soluzioni complete ► Si è posta particolare attenzione al rigore nella formulazione e nella dimostrazione dei risultati

Contents

Spazi di probabilità discreti: teoria.- Spazi di probabilità discreti: esempi e applicazioni.- Variabili aleatorie discrete: teoria.- Variabili aleatorie discrete: esempi e applicazioni.- Spazi di probabilità e variabili aleatorie generali.- Variabili aleatorie assolutamente continue.- Teoremi limite.- Applicazioni alla statistica matematica.- Appendice.- Tavola della distribuzione normale.- Principali distribuzioni notevoli su R.

Fields of interest

Probability Theory and Stochastic Processes; Statistics, general

Target groups

Lower undergraduate

Product category

Libro di testo introduttivo
New Series
Atlantis Series in Dynamical Systems

Series editors: H. Broer, B. Hasselblatt

The "Atlantis Studies in Dynamical Systems" publishes monographs in the area of dynamical systems, written by leading experts in the field and useful for both students and researchers. Books with a theoretical nature will be published alongside books emphasizing applications.
Paola Gloria Ferrario develops and investigates several methods of nonparametric local variance estimation. The first two methods use regression estimations (plug-in), achieving least squares estimates as well as local averaging estimates (partitioning or kernel type). Furthermore, the author uses a partitioning method for the estimation of the local variance based on first and second nearest neighbors (instead of regression estimation). Approaching specific problems of application fields, all the results are extended and generalised to the case where only censored observations are available. Further, simulations have been executed comparing the performance of two different estimators (R-Code available!). As a possible application of the given theory the author proposes a survival analysis of patients who are treated for a specific illness.

**Contents**


**Field of interest**

Mathematics, general

**Target groups**

Research

**Product category**

Monograph

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The book contains reproductions of the most important papers that gave birth to the first developments in nonlinear programming. Of particular interest is W. Karush’s often quoted Master Thesis, which is published for the first time. The anthology includes an extensive preliminary chapter, where the editors trace out the history of mathematical programming, with special reference to linear and nonlinear programming.

**Fields of interest**

Computational Science and Engineering; History of Mathematical Sciences

**Target groups**

Research

**Product category**

Contributed volume
E. Grigorieva, Texas Woman's University, TX, USA

Methods of Solving Complex Geometry Problems

This book is a unique collection of challenging geometry problems and detailed solutions that will build students' confidence in mathematics. By proposing several methods to approach each problem and emphasizing geometry's connections with different fields of mathematics, Methods of Solving Complex Geometry Problems serves as a bridge to more advanced problem solving. Written by an accomplished female mathematician who struggled with geometry as a child, it does not intimidate, but instead fosters the reader's ability to solve math problems through the direct application of theorems. Containing over 160 complex problems with hints and detailed solutions, Methods of Solving Complex Geometry Problems can be used as a self-study guide for mathematics competitions and for improving problem-solving skills in courses on plane geometry or the history of mathematics.

Features
► Contains over 160 complex problems with answers, hints, and detailed solutions  ► Serves as the bridge to more advanced texts in problem-solving  ► Serves as a self-study or extra resource in the classroom

Contents

Fields of interest
Geometry; History of Mathematical Sciences

Target groups
Lower undergraduate

Product category
Undergraduate textbook

Due August 2013
2013. XIV, 254 p. 195 illus., 29 in color. Hardcover
► * € (D) 42,79 | € (A) 43,99 | sFr 53,50
► € 39,99 | £35.99
ISBN 978-3-319-00704-5

P. Grinfeld, Drexel University, Philadelphia, PA, USA

Introduction to Tensor Analysis and the Calculus of Moving Surfaces

Features
► Is a self-contained introduction to tensor calculus containing over 150 exercises  ► Presents a clear geometric picture combined with an effective and elegant analytical technique  ► Uses an informal approach, focuses on concrete objects, and appeals to the reader's intuition with regard to fundamental concepts such as the Euclidean space, surface, and length  ► Covers the subject of tensor calculus in greater depth than existing published texts

Contents

Fields of interest
Differential Geometry; Calculus of Variations and Optimal Control; Optimization; Linear and Multilinear Algebras, Matrix Theory

Target groups
Upper undergraduate

Product category
Graduate/Advanced undergraduate textbook

Due July 2013
2013. XVI, 274 p. 37 illus., 5 in color. Hardcover
► * € (D) 53,49 | € (A) 54,99 | sFr 67,00
► € 49,99 | £44.99

T. Harima, Ehime University, Matsuyama, Japan; T. Maeno, Meijo University, Nagoya, Japan; H. Morita, Muroran Institute of Technology, Japan; Y. Numata, Shishu University, Matsumoto, Japan; A. Wachi, Hokkaido University of Education, Kushiro, Japan; J. Watanabe, Tokai University, Hiratsuka, Japan

The Lefschetz Properties

This is a monograph which collects basic techniques, major results and interesting applications of Lefschetz properties of Artinian algebras. The origin of the Lefschetz properties of Artinian algebras is the Hard Lefschetz Theorem, which is a major result in algebraic geometry. However, for the last two decades, numerous applications of the Lefschetz properties to other areas of mathematics have been found, as a result of which the theory of the Lefschetz properties is now of great interest in its own right.

Features
► This is the first book on the theory of Lefschetz properties  ► This is the first attempt to treat the theory of Lefschetz properties systematically  ► This book shows a wide connection of the Lefschetz properties to other areas of mathematics  ► So, Researchers from various area of mathematics should be interested in this book  ► This book contains many open problems  ► Some new results are contained (Some of them may appear as papers elsewhere. Some of them may not.)

Contents

Fields of interest
Algebra; Algebraic Geometry; Combinatorics

Target groups
Research

Product category
Monograph

Due July 2013
2013. X, 244 p. 20 illus. (Lecture Notes in Mathematics, Volume 2080) Softcover
► * € (D) 48,14 | € (A) 49,49 | sFr 60,00
► € 44,99 | £40.99
ISBN 978-3-642-38205-5
**The Hardy Space H1 with Non-doubling Measures and Their Applications**

The present book offers an essential but accessible introduction to the discoveries first made in the 1990s that the doubling condition is superfluous for most results for function spaces and the boundedness of operators. It shows the methods behind these discoveries, their consequences and some of their applications.

**Features**
- The arguments for the main results are detailed and self-contained
- At least one typical and easily explicable example is given for each important notion further clarifying the relationship between the known and the present notions
- Detailed references for the content of each chapter are given. Also, well-known related results and some unsolved problems, which will be of interest to the reader, are presented, which might be interesting to the reader

**Contents**
- Preliminaries
- Approximations of the Identity
- The Hardy Space H1(μ)
- The Local Atomic Hardy Space h1(μ)
- Boundedness of Operators over (RD, μ)
- Littlewood-Paley Operators and Maximal Operators Related to Approximations of the Identity
- The Hardy Space H1(χ, υ) and Its Dual Space RBMO (χ, υ)
- Boundedness of Operators over (χ, υ)

**Fields of interest**
- Fourier Analysis
- Functional Analysis
- Operator Theory

**Product category**
- Monograph

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**Advances in Structured Operator Theory and Related Areas**

This volume is dedicated to Leonid Lerer on the occasion of his seventieth birthday. The main part presents recent results in Lerer's research area of interest, which includes Toeplitz, Toeplitz plus Hankel, and Wiener-Hopf operators, Bezout equations, inertia type results, matrix polynomials, and related areas in operator and matrix theory. Biographical material and Lerer's list of publications are also included.

**Features**
- Novel results in structured operator theory, matrix polynomials, and related areas
- Includes personal statements and photos from professional friends of Leonid Lerer
- Collection of high-level essays

**Contents**
- Introduction
- List of publications of Leonid Lerer
- Contributions by various authors

**Fields of interest**
- Operator Theory
- Difference and Functional Equations
- Systems Theory, Control

**Target groups**
- Research

**Product category**
- Collection of essays
Mathematics

S. G. Krantz, Washington University in St. Louis, MO, USA

Geometric Analysis of the Bergman Kernel and Metric

This text provides a masterful and systematic treatment of all the basic analytic and geometric aspects of Bergman's classic theory of the kernel and its invariance properties. These include calculation, invariance properties, boundary asymptotics, and asymptotic expansion of the Bergman kernel and metric. Moreover, it presents a unique compendium of results with applications to function theory, geometry, partial differential equations, and interpretations in the language of functional analysis, with emphasis on the several complex variables context. Several of these topics appear here for the first time in book form.

Features

➤ Several topics are presented for the first time in book form ➤ Textbook for graduate students that will also benefit seasoned researchers in mathematics ➤ Includes illustrative examples and carefully chosen exercises ➤ Discusses applications to function theory, geometry, partial differential equations, and interpretations in terms of functional analysis

Contents


Fields of interest

Analysis; Partial Differential Equations; Functional Analysis

Target groups

Graduate

Product category

Graduate/Advanced undergraduate textbook

A. Kyprianou, University of Bath, UK

Fluctuations of Lévy Processes with Applications

Introductory Lectures

Lévy processes are the natural continuous-time analogue of random walks and form a rich class of stochastic processes around which a robust mathematical theory exists. Their application appears in the theory of many areas of classical and modern stochastic processes including storage models, renewal processes, insurance risk models, optimal stopping problems, mathematical finance, continuous-state branching processes and positive self-similar Markov processes.

Features

➤ Addresses recent developments in the potential analysis of subordinators ➤ Includes an extensive overview of the classical and modern theory of positive self-similar Markov processes ➤ Each chapter has a comprehensive set of exercises

Contents


Fields of interest

Probability Theory and Stochastic Processes; Quantitative Finance

Target groups

Graduate

Product category

Graduate/Advanced undergraduate textbook

P. D. Lax, New York University, NY, USA; M. S. Terrell, Cornell University, Ithaca, NY, USA

Calculus With Applications

This new edition of Lax, Burstein, and Lax’s Calculus with Applications and Computing offers meaningful explanations of the important theorems of single variable calculus. Written with students in mathematics, the physical sciences, and engineering in mind, and revised with their help, it shows that the themes of calculation, approximation, and modeling are central to mathematics and the main ideas of single variable calculus. This edition brings the innovation of the first edition to a new generation of students. New sections in this book use simple, elementary examples to show that when applying calculus concepts to approximations of functions, uniform convergence is more natural and easier to use than point-wise convergence.

Features

➤ New edition extensively revised and updated, including many new problems ➤ Features early treatment of sequences and series relates calculus to calculation and approximation ➤ Offers explanations of all the important theorems to help students understand their meaning

Contents


Fields of interest

Analysis; Applications of Mathematics

Target groups

Lower undergraduate

Product category

Undergraduate textbook

Due August 2013

2013. XVI, 342 p. 7 illus. (Graduate Texts in Mathematics, Volume 268) Hardcover
➤ approx. * € (D) 64,19 | € (A) 65,99 | sFr 79,00
➤ approx. € 59,99 | £53.99

Due July 2013

2nd ed. 2013. Approx. 470 p. (Universitext) Softcover
➤ * € (D) 64,19 | € (A) 65,99 | sFr 80,00
➤ € 59,99 | £39.99
ISBN 978-3-642-37631-3

Due August 2013

2nd ed. 2013. XII, 488 p. 150 illus. (Undergraduate Texts in Mathematics) Hardcover
➤ approx. * € (D) 53,49 | € (A) 54,99 | sFr 69,00
➤ approx. € 49,99 | £46.99
ISBN 978-1-4614-7945-1

72
A. McIneney, Bronx Community College, City University of New York, Bronx, NY, USA

First Steps in Differential Geometry

Riemannian, Contact, Symplectic

Differential geometry arguably offers the smoothest transition from the standard university mathematics sequence of the first four semesters in calculus, linear algebra, and differential equations to the higher levels of abstraction and proof encountered at the upper division by mathematics majors. Today it is possible to describe differential geometry as “the study of structures on the tangent space,” and this text develops this point of view.

Features
- Excellent for learning the use of basic results on qualitative theory of differential systems
- Illustrates how to use the Poincaré map for studying the periodic orbits of a differential system
- Shows the importance of compactification of the domain of definition of a differential system for the understanding of the global dynamics of the system
- Points out the importance of bifurcation diagrams for describing the different dynamics of differential systems depending on parameters

Contents
Preface.- 1 Introduction and statement of the main results.- 2 Basic elements of the qualitative theory of ODEs.- 3 Fundamental systems.- 4 Return results.- 5 Phase portraits.- Index.- Bibliography.

Fields of interest
Ordinary Differential Equations; Systems Theory; Control; Partial Differential Equations

Target groups
Graduate

Product category
Graduate/Advanced undergraduate textbook

Birkhäuser

Due August 2013

2013. Approx. 300 p. (Birkhäuser Advanced Texts Basler Lehrbücher) Hardcover
► approx.  * € (D) 64,15 | € (A) 65,95 | sFr 80,00
► approx.  € 59,95 | £53,99
ISBN 978-3-0348-0656-5

Due July 2013

2013. XI, 404 p. 53 illus., 25 in color. (Undergraduate Texts in Mathematics) Hardcover
►  * € (D) 64,19 | € (A) 65,99 | sFr 80,00
►  € 59,99 | £53,99
ISBN 978-1-4614-7731-0

Due December 2013

Only available in print

2012. 700 p. (Advances in Mathematical Fluid Mechanics, Volume) Hardcover
► approx.  * € (D) 139,05 | € (A) 142,94 | sFr 186,50
► approx.  € 129,95 | £117.00
ISBN 978-3-0348-0230-7

News 6/2013
Mathematics

G. Philippis, Hausdorff Center for Mathematics, Bonn, Germany

Regularity of Optimal Transport Maps and Applications

In this thesis, we study the regularity of optimal transport maps and its applications to the semi-geostrophic system. The first two chapters survey the known theory, in particular there is a self-contained proof of Brenier’s theorem on existence of optimal transport maps and of Caffarelli’s Theorem on Holder continuity of optimal maps. In the third and fourth chapter we start investigating Sobolev regularity of optimal transport maps, while in Chapter 5 we show how the above mentioned results allows to prove the existence of Eulerian solution to the semi-geostrophic equation.

Features

► Essentially self-contained account of the known regularity theory of optimal maps in the case of quadratic cost. ► Presents proofs of some recent results like Sobolev regularity and Sobolev stability for optimal maps and their applications to the semi-geostrophic system. ► Proves for the first time a partial regularity theorem for optimal map with respect to a general cost function.

Contents


Field of interest

Calculus of Variations and Optimal Control; Optimization

Target groups

Research

Product category

Monograph

Due August 2013

► approx. *€ (D) 19,26 | € (A) 19,80 | sFr 24,00
► approx. € 18,00 | £16.99
ISBN 978-88-7642-456-4

J. Rappaz, Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland; R. Touzani, Universite Blaise Pascal Polytech Clermont-Ferrand, Aubiere, France

Mathematical and Numerical Models for Eddy Currents and Magnetostatics

With Selected Applications

This monograph addresses fundamental aspects of mathematical modeling and numerical solution methods of electromagnetic problems involving low frequencies, i.e. magnetostatic and eddy current problems which are rarely presented in the applied mathematics literature. In the first part, the authors introduce the mathematical models in a realistic context in view of their use for industrial applications.

Features

► Thorough description of eddy current processes from an applied mathematics perspective. ► Contains a large list of industrial applications with their mathematical formulations. ► Addresses the mathematical analysis of coupled problems involving eddy currents.

Contents


Fields of interest

Computational Science and Engineering; Numerical and Computational Physics; Applied Mathematics/Computational Methods of Engineering

Target groups

Research

Product category

Monograph

Due August 2013

2013. 200 p. 100 illus. (Scientific Computation) Hardcover
► *€ (D) 85,55 | € (A) 87,95 | sFr 115,00
► € 79,95 | £72.00
ISBN 978-94-007-0201-1

A. Sarti, CREA/CNRS, Paris, France; G. Citti, University of Bologna, Italy (Eds)

Neuromathematics of Vision

This book develops mathematical models of the primary visual cortex and proposes geometrical models of its functional architecture, i.e. the internal organization of its neural connectivity. It aims at explaining the neuromathematics immanent to visual perception and at clarifying the neural origin of spatial representations. The constitution of perceptual units is considered in relation to its neural implementation as the emergence of activity patterns in the connectivity structure of the primary visual cortex. The book also includes algorithms which are necessary to simulate the functionality of the visual cortex. It is written by specialists of the field and primarily addresses researchers but may also be beneficial for graduate students.

Features

► Includes helpful algorithms for applications in computer vision and bioengineering. ► Rigorous mathematical approach. ► Written by experts in the field

Fields of interest

Mathematical Models of Cognitive Processes and Neural Networks; Image Processing and Computer Vision; Cognitive Psychology

Target groups

Research

Product category

Monograph

Due September 2013

2013. Approx. 290 p. 80 illus., 30 in color. (Lecture Notes in Morphogenesis) Hardcover
► approx. *€ (D) 106,95 | € (A) 109,95 | sFr 133,50
► approx. € 99,95 | £90.00
ISBN 978-3-642-34443-5
Z. Schuss, Tel Aviv University, Israel

**Brownian Dynamics at Boundaries and Interfaces**

In Physics, Chemistry, and Biology

Brownian dynamics serve as mathematical models for the diffusive motion of microscopic particles of various shapes in gaseous, liquid, or solid environments. The renewed interest in Brownian dynamics is due primarily to their key role in molecular and cellular biophysics: diffusion of ions and molecules is the driver of all life. Brownian dynamics simulations are the numerical realizations of stochastic differential equations that model the functions of biological micro devices such as protein ionic channels of biological membranes, cardiac myocytes, neuronal synapses, and many more. Stochastic differential equations are ubiquitous models in computational physics, chemistry, biophysics, computer science, communications theory, mathematical finance theory, and many other disciplines.

**Fields of interest**

Probability Theory and Stochastic Processes; Partial Differential Equations; Mathematical Methods in Physics

**Target groups**

Graduate

**Product category**

Graduate/Advanced undergraduate textbook

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**J.-P. Serre**, Collège de France, Paris, France

**Oeuvres - Collected Papers**

**Volume 2: 1960 - 1971**

The impact and influence of Jean-Pierre Serre’s work have been notable ever since his doctoral thesis on homotopy groups. The abundance of significant results and deep insight contained in his research and survey papers ranging through topology, several complex variables, and algebraic geometry to number theory, group theory, commutative algebra and modular forms, continues to provide inspiring reading for mathematicians working in these areas, in their research and their teaching. Characteristic of Serre’s publications are the many open questions he formulated suggesting further research directions. Four volumes specify how he has provided comments on and corrections to most articles, and described the present status of the open questions with reference to later results. Jean-Pierre Serre is one of a few mathematicians to have won the Fields medal, the Abel prize, and the Wolf prize.

**Fields of interest**

Number Theory; Algebraic Geometry; Category Theory; Homological Algebra

**Target groups**

Research

**Product category**

Graduate/Advanced undergraduate textbook

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**I. R. Shafarevich**, Steklov Mathematical Institute, Moscow, Russia

**Basic Algebraic Geometry 1**

**Varieties in Projective Space**

Transl. Russian: M. Reid, Warwick University, UK

Shafarevich’s Basic Algebraic Geometry has been a classic and universally used introduction to the subject since its first appearance over 40 years ago. As the translator writes in a preface note, “For all [advanced undergraduate and beginning graduate] students, and for the many specialists in other branches of math who need a liberal education in algebraic geometry, Shafarevich’s book is a must.” The third edition, in addition to some minor corrections, now offers a new treatment of the Riemann–Roch theorem for curves, including a proof from first principles. Shafarevich’s book is an attractive and accessible introduction to algebraic geometry, suitable for beginning students and nonspecialists, and the new edition is set to remain a popular introduction to the field.

**Fields of interest**

Algebraic Geometry; Theoretical, Mathematical and Computational Physics

**Target groups**

Graduate

**Product category**

Graduate/Advanced undergraduate textbook

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Due July 2013

2013. X. 333 p. 46 illus., 9 in color. (Applied Mathematical Sciences, Volume 186) Hardcover

- € (D) 64,19 | € (A) 65,99 | sFr 80,00
- € 59,99 | £33.99


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**J.-P. Serre**, Collège de France, Paris, France

**Oeuvres - Collected Papers**

**Volume 2: 1960 - 1971**

The impact and influence of Jean-Pierre Serre’s work have been notable ever since his doctoral thesis on homotopy groups. The abundance of significant results and deep insight contained in his research and survey papers ranging through topology, several complex variables, and algebraic geometry to number theory, group theory, commutative algebra and modular forms, continues to provide inspiring reading for mathematicians working in these areas, in their research and their teaching. Characteristic of Serre’s publications are the many open questions he formulated suggesting further research directions. Four volumes specify how he has provided comments on and corrections to most articles, and described the present status of the open questions with reference to later results. Jean-Pierre Serre is one of a few mathematicians to have won the Fields medal, the Abel prize, and the Wolf prize.

**Fields of interest**

Number Theory; Algebraic Geometry; Category Theory; Homological Algebra

**Target groups**

Research

**Product category**

Graduate/Advanced undergraduate textbook

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Due July 2013

2013. VI, 742 p. (Springer Collected Works in Mathematics) Broché

- € (D) 64,19 | € (A) 65,99 | sFr 80,00
- € 59,99 | £51.99

ISBN 978-3-642-37955-0

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**I. R. Shafarevich**, Steklov Mathematical Institute, Moscow, Russia

**Basic Algebraic Geometry 1**

**Varieties in Projective Space**

Transl. Russian: M. Reid, Warwick University, UK

Shafarevich’s Basic Algebraic Geometry has been a classic and universally used introduction to the subject since its first appearance over 40 years ago. As the translator writes in a preface note, "For all [advanced undergraduate and beginning graduate] students, and for the many specialists in other branches of math who need a liberal education in algebraic geometry, Shafarevich’s book is a must." The third edition, in addition to some minor corrections, now offers a new treatment of the Riemann–Roch theorem for curves, including a proof from first principles. Shafarevich’s book is an attractive and accessible introduction to algebraic geometry, suitable for beginning students and nonspecialists, and the new edition is set to remain a popular introduction to the field.

**Fields of interest**

Algebraic Geometry; Theoretical, Mathematical and Computational Physics

**Target groups**

Graduate

**Product category**

Graduate/Advanced undergraduate textbook

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Due July 2013

2003. VI, 742 p. (Springer Collected Works in Mathematics) Broché

- € (D) 64,19 | € (A) 65,99 | sFr 80,00
- € 59,99 | £51.99

ISBN 978-3-642-37725-9

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**I. R. Shafarevich**, Steklov Mathematical Institute, Moscow, Russia

**Basic Algebraic Geometry 1**

**Varieties in Projective Space**

Transl. Russian: M. Reid, Warwick University, UK

Shafarevich’s Basic Algebraic Geometry has been a classic and universally used introduction to the subject since its first appearance over 40 years ago. As the translator writes in a preface note, “For all [advanced undergraduate and beginning graduate] students, and for the many specialists in other branches of math who need a liberal education in algebraic geometry, Shafarevich’s book is a must.” The third edition, in addition to some minor corrections, now offers a new treatment of the Riemann–Roch theorem for curves, including a proof from first principles. Shafarevich’s book is an attractive and accessible introduction to algebraic geometry, suitable for beginning students and nonspecialists, and the new edition is set to remain a popular introduction to the field.

**Fields of interest**

Algebraic Geometry; Theoretical, Mathematical and Computational Physics

**Target groups**

Graduate

**Product category**

Graduate/Advanced undergraduate textbook

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2013. VI, 742 p. (Springer Collected Works in Mathematics) Broché

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- € 59,99 | £51.99

ISBN 978-3-642-37955-0
Due August 2013

Original third Russian edition published in one volume by MCCME, Moscow, 2007

► € (D) 33,49 | € (A) 34,99 | sFr 67,00
► 49,99 | 44,99
ISBN 978-3-642-38009-9

Due July 2013

2013. XX, 454 p. 167 illus., 131 in color. Hardcover
► € (D) 101,64 | € (A) 104,49 | sFr 160,00
► 94,99 | 85,50
ISBN 978-3-319-00439-6

Due August 2013

2nd ed. 2013. XII, 314 p. 100 illus., 10 in color. Hardcover
► € (D) 64,19 | € (A) 65,99 | sFr 93,99
► 59,99 | 53,99
ISBN 978-1-4614-7971-0
M. Trifković, University of Victoria, BC, Canada

**Algebraic Theory of Quadratic Numbers**

By focusing on quadratic numbers, this advanced undergraduate or master's level textbook on algebraic number theory is accessible even to students who have yet to learn Galois theory. The techniques of elementary arithmetic, ring theory and linear algebra are shown working together to prove important theorems, such as the unique factorization of ideals and the finiteness of the ideal class group. The book concludes with two topics particular to quadratic fields: continued fractions and quadratic forms. The treatment of quadratic forms is somewhat more advanced than usual, with an emphasis on their connection with ideal classes and a discussion of Bhargava cubes. The numerous exercises in the text offer the reader hands-on computational experience with elements and ideals in quadratic number fields. The reader is also asked to fill in the details of proofs and develop extra topics, like the theory of orders. Prerequisites include elementary number theory and a basic familiarity with ring theory.

**Features**
- Offers an accessible introduction to number theory by focusing on quadratic numbers
- Includes many exercises that provide students with hands-on computational experience with quadratic number fields
- Presents a modern treatment of binary quadratic forms

**Contents**
1 Examples.
2 A Crash Course in Ring Theory.
3 Lattices.
4 Arithmetic in Q[√D].
5 The Ideal Class Group and Geometry of Numbers.
6 Continued Fractions.
7 Quadratic Forms.
Appendix:
Hints to Selected Exercises.
Index.

**Fields of interest**
- Number Theory; Algebra

**Target groups**
- Graduate

**Product category**
- Graduate/Advanced undergraduate textbook

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C. Wang, Institute of Analysis, LLC, MI, USA

**Application of Integrable Systems to Phase Transitions**

The eigenvalue densities in various matrix models in quantum chromodynamics (QCD) are ultimately unified in this book by a unified model derived from the integrable systems. Many new density models and free energy functions are consequently solved and presented. The phase transition models including critical phenomena with fractional power-law for the discontinuities of the free energies in the matrix models are systematically classified by means of a clear and rigorous mathematical demonstration. The methods here will stimulate new research directions such as the important Seiberg-Witten differential in Seiberg-Witten theory for solving the mass gap problem in quantum Yang-Mills theory. The formulations and results will benefit researchers and students in the fields of phase transitions, integrable systems, matrix models and Seiberg-Witten theory.

**Features**
- First book in the field of matrix models to apply integrable systems to solve the phase transition problems
- The only book to date to provide a unified model for the densities of eigenvalues in quantum chromodynamics (QCD)
- An application book but with rigorous mathematical proofs to present a systematic classification of phase transition models in the momentum aspect

**Contents**
Introduction.
- Densities in Hermitian Matrix Models.
- Bifurcation Transitions and Expansions.
- Large-N Transitions and Critical Phenomena.
- Densities in Unitary Matrix Models.
- Transitions in the Unitary Matrix Models.
- Marcenko-Pastur Distribution and McKay's Law.

**Fields of interest**
- Mathematical Applications in the Physical Sciences; Special Functions; Mathematical Physics

**Target groups**
- Research

**Product category**
- Monograph

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F.-Y. Wang, Beijing Normal University, China

**Harnack Inequalities for Stochastic Partial Differential Equations**

In this book the author presents a self-contained account of Harnack inequalities and applications for the semigroup of solutions to stochastic partial and delayed differential equations. Since the semigroup refers to Fokker-Planck equations on infinite-dimensional spaces, the Harnack inequalities the author investigates are dimension-free. This is an essentially different point from the above mentioned classical Harnack inequalities.

**Features**
- Focuses on dimension-free Harnack inequalities with applications to typical models of stochastic partial/delayed differential equations
- A useful reference for researchers and graduated students in probability theory, stochastic analysis, partial differential equations and functional analysis
- Comparing with exiting Harnack inequalities in analysis which applies only to finite-dimensional models, those introduced in the book are dimension-free and thus are efficient also in infinite dimensions

**Contents**
- A General Theory on Dimension-Free Harnack Inequalities.
- Non-Linear Monotone Stochastic Partial Differential Equations.
- Non-Linear Monotone Stochastic Partial Differential Equations.

**Fields of interest**
- Partial Differential Equations; Probability Theory and Stochastic Processes; Analysis

**Target groups**
- Research

**Product category**
- Brief

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Due July 2013

2013. X, 203 p. 11 illus. (Universitext) Softcover
- € (D) 53,49 | € (A) 54,99 | sFr 67,00
- € 49,99 | £29.99
ISBN 978-1-4614-7716-7

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Due August 2013

2013. X, 127 p. (SpringerBriefs in Mathematics) Softcover
- € (D) 53,49 | € (A) 54,99 | sFr 67,00
- € 49,99 | £44.99
ISBN 978-1-4614-7933-8

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Due August 2013

- approx. € (D) 90,94 | € (A) 93,49 | sFr 113,50
- approx. € 84,99 | £76.50
ISBN 978-3-642-38564-3

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Due August 2013

2013. X, 127 p. (SpringerBriefs in Mathematics) Softcover
- € (D) 53,49 | € (A) 54,99 | sFr 67,00
- € 49,99 | £44.99
ISBN 978-1-4614-7933-8