Three-Dimensional Flows

In this book, the authors present the elements of a general theory for flows on three-dimensional compact boundaryless manifolds, encompassing flows with equilibria accumulated by regular orbits. The book aims to provide a global perspective of this theory and make it easier for the reader to digest the growing literature on this subject. This is not the first book on the subject of dynamical systems, but there are distinct aspects which together make this book unique.

Features
- First comprehensive treatment of this subject in book form
- Ease of reference to the main results in the theory with complete proofs and precise statements
- Very recent results (published mostly from 1998 onwards) providing an extension of the theory of uniform hyperbolicity to flows with attractors having singularities accumulated by regular orbits inside the attractor

Contents

Fields of interest
Dynamical Systems and Ergodic Theory; Ordinary Differential Equations; Theoretical, Mathematical and Computational Physics

Target groups
Research

Type of publication
Monograph
### Regularity of Minimal Surfaces

Regularity of Minimal Surfaces begins with a survey of minimal surfaces with free boundaries. Following this, the basic results concerning the boundary behaviour of minimal surfaces and \( H \)-surfaces with fixed or free boundaries are studied. In particular, the asymptotic expansions at interior and boundary point of free boundaries are derived, leading to general Gauss-Bonnet formulas. Furthermore, gradient estimates and asymptotic expansions for minimal surfaces with only piecewise smooth boundaries are obtained. One of the main features of free boundary value problems for minimal surfaces is that, for principal reasons, it is impossible to derive a priori estimates. Therefore, regularity proofs for non-minimizers have to be based on indirect reasoning using monotonicity formulas.

### Fields of interest

- Calculus of Variations and Optimal Control
- Optimization; Differential Geometry; Partial Differential Equations

### Target groups

Research

### Type of publication

Monograph

**Due April 2010**

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<td>€ 99.95 / £90.00</td>
<td>2nd ed.</td>
<td>ISBN 978-3-642-11699-5</td>
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### Global Analysis of Minimal Surfaces

Many properties of minimal surfaces are of a global nature, and this is already true for the results treated in the first two volumes of the treatise. Part I of the present book can be viewed as an extension of these results. For instance, the first two chapters deal with existence, regularity and uniqueness theorems for minimal surfaces with partially free boundaries. Here one of the main features is the possibility of "edge-crawling" along free parts of the boundary.

### From the contents

- Introduction
- Part I. Boundary Behaviour of Minimal Surfaces
- Part II. Global Analysis of Minimal Surfaces

**Fields of interest**

- Calculus of Variations and Optimal Control
- Optimization; Differential Geometry; Partial Differential Equations

**Target groups**

Research

**Type of publication**

Monograph

**Due May 2010**

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Selected Works of R.M. Dudley

For almost fifty years, Richard M. Dudley has been extremely influential in the development of several areas of Probability. His work on Gaussian processes led to the understanding of the basic fact that their sample boundedness and continuity should be characterized in terms of proper measures of complexity of their parameter spaces equipped with the intrinsic covariance metric. His sufficient condition for sample continuity in terms of metric entropy is widely used and was proved by X. Fernique to be necessary for stationary Gaussian processes, whereas its more subtle versions (majorizing measures) were proved by M. Talagrand to be necessary in general.

Features
- Includes his major journal publications plus commentaries in the papers by the editors.
- Includes a complete bibliography
- Electronic version is freely available on SpringerLink

From the contents
Chapter 1: Convergence in Law: Weak convergence of probabilities on nonseparable metric spaces and empirical measures on Euclidean spaces.
- Measures on non-separable metric spaces.
- Distances of probability measures and metric spaces.
- Measures on non-separable metric spaces.
- Distances of probability measures and empirical measures.

Chapter 2: Markov Processes: Definitions of Donsker class, and weighted empirical random variables.
- An extended Wichura theorem.
- Distances of probability measures and metric spaces.
- Measures on non-separable metric spaces.

- Chapter 2: Markov Processes: Definitions of Donsker class, and weighted empirical random variables.
- An extended Wichura theorem.
- Distances of probability measures and metric spaces.

Fields of interest
- Probability Theory and Stochastic Processes
- Statistical Theory and Methods
- Continuity of Gaussian processes.
- The sizes of compact subsets of Hilbert space and Markov processes.

- Chapter 2: Markov Processes: Definitions of Donsker class, and weighted empirical random variables.
- An extended Wichura theorem.
- Distances of probability measures and metric spaces.

Features
- Invited articles by top notch experts
- Focus is on topics in representation theory of algebraic groups and quantum groups
- Of interest to graduate students and researchers in representation theory, group theory, algebraic geometry, quantum theory and math physics

Contents

Fields of interest
- Group Theory and Generalizations
- Algebraic Geometry
- Topological Groups, Lie Groups
- Representation Theory

Target groups
Research

Type of publication
Contributed volume

Film Flows, Wave Instabilities and Thermocapillarity

This research monograph gives a detailed review of the state-of-the-art theoretical methodologies for the analysis of dissipative wave dynamics and pattern formation on the surface of a film falling down a planar, inclined substrate. This prototype is an open-flow hydrodynamic instability representing an excellent paradigm for the study of complexity in active nonlinear media with energy supply, dissipation and dispersion. Whenever possible, the link between theory and experiments is illustrated and the development of order-of-magnitude estimates and scaling arguments is used to facilitate the understanding of the underlying basic physics. It will be of benefit to a variety of readers, including advanced graduate students interested in interfacial fluid mechanics, researchers working on the theoretical and experimental aspects of thin film flows, and engineers whose work involves thin films, either isothermal or heated.

Features
- There has not yet been a text that covers the whole spectrum of theoretical/experimental aspects of thin film flows
- A significant part of the proposed monograph comes from original research undertaken by the authors, either separately or in collaboration

Contents

Fields of interest
- Applications of Mathematics: Classical Continuum Physics
- Applied Mathematics: Computational Methods of Engineering

Target groups
Research

Type of publication
Monograph

BIRKHAUSER

Due April 2010

- approx. € 109,95 | £99.00
- approx. * € 117,65 | € (A) 120,95 | sFr 177,00
ISBN 978-0-8176-4696-7

Due July 2010

- approx. € 55,00 | £50.99
- approx. * € 60,50 | € (A) 60,50 | sFr 91,50
ISBN 978-1-4419-5820-4
A Course in Commutative Algebra

Kemper’s "Course in Commutative Algebra" presents a thorough, modern introduction to the subject. With carefully selected topics presented in a natural geometric context, the author’s key focus is on concepts and results in the field. But, while emphasizing theory the presentation is enriched with three chapters covering computational aspects of the subject. This user-friendly textbook motivates the reader with numerous examples, figures, and exercises, and is well designed for a one- or two-semester course in a classroom setting.

Features
► Excellently written textbook in commutative algebra  ► Book makes getting into the subject easier for students than with existing works  ► Well-known mathematician

Contents

Fields of interest
Algebraic Geometry; Commutative Rings and Algebras; Computational Mathematics and Numerical Analysis

Target groups
Graduate

Type of publication
Graduate/Advanced undergraduate textbook

Numerical Techniques for Global Atmospheric Models

This book surveys recent developments in numerical techniques for global atmospheric models. It is based upon a collection of lectures prepared by leading experts in the field. The chapters reveal the multitude of steps that determine the global atmospheric model design. They encompass the choice of the equation set, computational grids on the sphere, horizontal and vertical discretizations, time integration methods, filtering and diffusion mechanisms, conservation properties, tracer transport, and considerations for designing models for massively parallel computers. A reader interested in applied numerical methods but also the many facets of atmospheric modeling should find this book of particular relevance.

Contents

Fields of interest
Computational Mathematics and Numerical Analysis; Partial Differential Equations; Meteorology/Climatology

Target groups
Research

Type of publication
Contributed volume

Teoria Spettrale e Meccanica Quantistica

Operatori in Spazi di Hilbert

Scopo principale di questo libro è quello di esporre i fondamenti matematici della Meccanica Quantistica (non relativistica) in modo matematicamente rigoroso. Il libro può considerarsi un testo introduttivo all’analisi funzionale lineare sugli spazi di Hilbert, con particolare enfasi su alcuni risultati di teoria spettrale. Le idee matematiche vengono sviluppate in modo astratto e logicamente indipendente dalla trattazione fisica, che appare comunque nelle motivazioni e nelle applicazioni. Inoltre, il libro si prefigge di raccogliere in un unico testo diversi utili risultati rigorosi, ma più avanzati di quanto si trovi nei manuali di fisica quantistica, sulla struttura matematica della Meccanica Quantistica.

Features
► Approccio rigoroso assiomatico dei fondamenti matematici della meccanica quantistica.  ► Approccio autoconsistente dal punto di vista matematico.  ► Il testo include una raccolta di molti risultati rigorosi (quasi tutti dimostrati) e corredati di esercizi.

Fields of interest
Matematica applicata; Mathematical and Computational Physics ; Metodi matematici in fisica

Target groups
Lower undergraduate

Type of publication
Libro di testo introduttivo
J. Necas, Charles University, Prague, Czech Republic

Direct Methods in the Theory of Elliptic Equations

Necas’s famous book EM Direct methods in the theory of elliptic equations /EM has become standard reference material on the mathematical theory of linear elliptic equations and systems, and also on the related function spaces framework. It provides a concise and self-contained introduction to the modern theory of partial differential equations, the theory of weak solutions and related topics. It is recommended to scientists working in the field of partial differential equations, postgraduate and graduate students, and applied mathematicians.

Features

- Present edition provides updates

Contents


Fields of interest

Partial Differential Equations; Functional Analysis

Target groups

Research

Type of publication

Monograph

Due June 2010


2010. 390 p. Hardcover

(approx. € 89.95 | £81.00)

(approx. € (D) 96.25 | € (A) 98.95 | sFr 149.50)

ISBN 978-3-642-10454-1