

V. Araujo, Universidade do Porto and Instituto de Matemática, UFRJ, Brazil; M. J. Pacifico, Universidade Federal do Rio de Janeiro, Brazil

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

1 Introduction.- 2 Preliminary Definitions and Results.- 3 Robust Singular Attractors.- 4 Robustness on the Whole Ambient Space.- 5 Robust Transitivity.- 6 Singular-Hyperbolicity and Robustness.- 7 Expansiveness and Physical Measure.- 8 Singular-Hyperbolicity and Volume.- 9 Global Dynamics of Generic 3-Flows.- 10 Recent Developments.- A Lyapunov Stability on Generic Vector Fields.- B A Perturbation Lemma for Flows.- C Robustness of Dominated Decomposition.- References.- Index.

Fields of interest

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

Target groups

Research

Type of publication

Monograph

 Mathematics

Due June 2010

2010. Approx. 355 p. (Ergebnisse der Mathematik und ihrer Grenzgebiete. 3. Folge A Series of Modern Surveys in Mathematics, Volume 53) Hardcover

► € 139,95 | £126.00
► * € (D) 149,75 | € (A) 153,95 | sFr 217,50
ISBN 978-3-642-11413-7



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B. Després, Université Paris VI, France

Lois de Conservations Eulériennes, Lagrangiennes et Méthodes Numériques

Les systèmes de lois de conservation non linéaires modélisent les écoulements compressibles et incompressibles dans des domaines extrêmement variés tels que l'aéronautique, l'hydrodynamique, la physique des plasmas, la combustion, le trafic routier, l'élasticité non linéaire. Le cadre mathématique général est celui des systèmes de lois de conservation. Les exemples physiques sont nombreux et souvent spectaculaires. Cela contribue à fonder une nouvelle discipline, la Mécanique des Fluides Numérique. La présentation proposée porte l'accent sur les systèmes que l'on appellera lagrangiens ou écrits en coordonnées de Lagrange, sur leurs relations avec les systèmes en coordonnées d'Euler et sur les possibilités que cela offre pour la construction et l'analyse de schémas numériques entropiques. De nombreux exemples numériques sont présentés en liaison avec le contexte physique, ainsi que des exercices.

Field of interest

Mathématique, généralités

Target groups

Research

Type of publication

Monographie

 Mathematics

A paraître mai 2010

2010. 300 p. (Mathématiques et Applications, Volume 68) Broché

► approx. € 52,13 | £46.99
► approx. * € (D) 55,78 | € (A) 57,34 | sFr 81,00
ISBN 978-3-642-11656-8



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U. Dierkes, University of Duisburg, Germany; S. Hildebrandt, University of Bonn, Germany; F. Sauvigny, Brandenburg University of Technology, Cottbus, Germany

Minimal Surfaces

Minimal Surfaces is the first volume of a three volume treatise on minimal surfaces (Grundlehren Nr. 339-341). Each volume can be read and studied independently of the others. The central theme is boundary value problems for minimal surfaces. The treatise is a substantially revised and extended version of the monograph Minimal Surfaces I, II (Grundlehren Nr. 295 & 296).

Features

► Long expected 2nd ed. of the Grundlehren vol. 295

Contents

Introduction.- Part I. Introduction to the Geometry of Surfaces and to Minimal Surfaces.- 1. Differential Geometry of Surfaces in Three-Dimensional Euclidean Space.- 2. Minimal Surfaces.- 3. Representation Formulas and Examples of Minimal Surfaces.- Part II. Plateau's Problem.- 4. The Plateau Problem, and its Ramifications.- 5. Stable Minimal- and H-Surfaces.- 6. Unstable Minimal Surfaces.- 7. Graphs with Prescribed Mean Curvature.- 8. Introduction to the Douglas Problem.- Problems.- 9. Appendix 1. On Relative Minimizers of Area and Energy.- Appendix 2. Minimal Surfaces in Heisenberg Groups.- Bibliography.- Index.

Fields of interest

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

Target groups

Research

Type of publication

Monograph

 Mathematics

Due April 2010

Originally published as volume 295 in the series: Grundlehren der mathematischen Wissenschaft

2nd ed. 2010. 670 p. (Grundlehren der mathematischen Wissenschaften, Volume 339) Hardcover

► € 99,95 | £90.00
► * € (D) 106,95 | € (A) 109,95 | sFr 155,50
ISBN 978-3-642-11697-1



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U. Dierkes, University of Duisburg, Germany;
S. Hildebrandt, University of Bonn, Germany;
A. J. Tromba, University of California, Santa Cruz,
CA, USA

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 branch points 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.

Features

- ▶ Together with vol. 341 it is the expected 2nd edition of the Grundlehren vol. 296
- ▶ Discusses geometric properties of minimal and H-surfaces
- ▶ Includes a new approach to the Osserman-Gulliver-Alt theorem

From the contents

Introduction.- Part I. Boundary Behaviour of Minimal Surfaces.- 1. Minimal Surfaces with Free Boundaries.- 2. The Boundary Behaviour of Minimal.- 3. Singular Boundary Points of Minimal Surfaces.- Part II. Geometric Properties 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



Mathematics

Due April 2010

Originally published as part of volume 296 in the series: Grundlehren der mathematischen Wissenschaft

2nd ed. 2010. X, 580 p. (Grundlehren der mathematischen Wissenschaften, Volume 340) Hardcover

- ▶ € 99,95 | £90.00
 - ▶ * € (D) 106,95 | € (A) 109,95 | sFr 155,50
- ISBN 978-3-642-11699-5



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U. Dierkes, University of Duisburg, Germany;
S. Hildebrandt, University of Bonn, Germany;
A. J. Tromba, University of California, Santa Cruz,
CA, USA

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. The third chapter deals with a priori estimates for minimal surfaces in higher dimensions and for minimizers of singular integrals related to the area functional. In particular, far reaching Bernstein theorems are derived.

Features

- ▶ Together with vol. 340 it is the long expected 2nd edition of the Grundlehren vol. 296
- ▶ First part is the extension of the results treated in volumes 339 and 340
- ▶ Second Part contains a "global theory of minimal surfaces" as envisioned by Smale

From the contents

Part I. Free Boundaries and Bernstein Theorems.- 1. Minimal Surfaces with Supporting Half-Planes.- 2. Embedded Minimal Surfaces with Partially Free Boundaries.- 3. Bernstein Theorems and Related Results.- Part II. Global Analysis of Minimal Surfaces.- 4. The General Problem of Plateau: Another Approach.

Fields of interest

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

Target groups

Research

Type of publication

Monograph



Mathematics

Due April 2010

Originally published as part of volume 296 in the series: Grundlehren der mathematischen Wissenschaften

2nd ed. 2010. 550 p. (Grundlehren der mathematischen Wissenschaften, Volume 341) Hardcover

- ▶ € 99,95 | £90.00
 - ▶ * € (D) 106,95 | € (A) 109,95 | sFr 155,50
- ISBN 978-3-642-11705-3



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U. Dierkes, S. Hildebrandt, F. Sauvigny,
A. J. Tromba, University of California, Santa Cruz,
CA, USA

Minimal Surfaces

The three-volume treatise consists of the volumes Minimal Surfaces (GL 339), Regularity of Minimal Surfaces (GL 340), and Global Theory of Minimal Surfaces (GL 341) that replace the monograph Minimal Surfaces I, II, published as volumes 295 and 296 of the Grundlehren der mathematischen Wissenschaft series. Their first volume covers the classical theory as well as existence results concerning boundary value problems for minimal surfaces, in particular results for Plateau's problem. The second volume deals with basic regularity results for minimal surfaces concerning their boundary behaviour at Plateau boundaries and free boundaries. Moreover, enclosure theorems, isoperimetric inequalities and existence theorems for surfaces of prescribed mean curvature in a Riemannian manifold and for the thread problem are discussed. Finally, the third volume deals with geometric properties of minimal surfaces with free boundaries and with a priori gradient estimates for n-dimensional minimal surfaces, leading to various Bernstein-type theorems. Secondly, a global theory of minimal surfaces (as envisioned by Smale) is presented, including index theorems.

Fields of interest

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

Target groups

Research

Type of publication

Monograph



Mathematics

Due May 2010

Originally published as volumes 295 and 296 in series: Grundlehren der mathematischen Wissenschaft series

2nd ed. 2010. Approx. 1960 p. (Grundlehren der mathematischen Wissenschaften, Volume 339-341) (3-volume-set) Hardcover

- ▶ € 289,85 | £261.00
 - ▶ * € (D) 310,14 | € (A) 318,84 | sFr 450,00
- ISBN 978-3-642-11715-2



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E. Giné, University of Connecticut, Storrs, CT, USA;
V. Koltchinskii, R. Norvaiša, Institute of Mathematics
and Informatics, Vilnius, Lithuania (Eds.)

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 random variables.- An extended Wichura theorem, definitions of Donsker class, and weighted empirical distributions.- Chapter 2: Markov Processes: Lorentz-invariant Markov processes in relativistic phase space.- A note on Lorentz-invariant Markov processes.- Asymptotics of some relativistic Markov processes.- Chapter 3: Gaussian Processes: The sizes of compact subsets of Hilbert space and continuity of Gaussian processes.

Fields of interest

Probability Theory and Stochastic Processes;
Statistical Theory and Methods

Target groups

Research

Type of publication

Collected works

A. Gyoja, Nagoya University, Nagoya, Japan;
H. Nakajima, Kyoto University, Kyoto, Japan;
K. Shinoda, Sophia University, Tokyo, Japan; T. Shoji,
Nagoya University, Nagoya, Japan; T. Tanisaki, Osaka
City University, Osaka, Japan (Eds.)

Representation Theory of Algebraic Groups and Quantum Groups

This volume contains invited articles written by leading mathematicians in the field. The focus is on such topics as modular representations of algebraic groups, representations of quantum groups and crystal bases, representations of affine Lie algebras, representations of affine Hecke algebras, modular representations of finite reductive groups, and related topics.

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

Preface.- H.H. Andersen.- T. Arakawa.- S. Ariki.-
J. Du.- M. Geck.- V. Ginzburg.- J.C. Jantzen.-
S.-J. Kang.- M. Kashiwara.- S. Kato.- G.I. Lehrer.-
G. Lusztig.- I. Mirkovic.- H. Miyachi.-
H. Nakajima.- T. Nakashima.- R. Rouquier.-
D. Sagaki.- Y. Saito.- O. Schiffmann.- T. Suzuki.-
T. Tanisaki.- J. Xiao.

Fields of interest

Group Theory and Generalizations; Algebraic
Geometry; Topological Groups, Lie Groups

Target groups

Research

Type of publication

Contributed volume

S. Kalliadasis, Imperial College London, UK;
C. Ruyer-Quil, Laboratoire FAST, Paris, France;
B. Scheid, Université Libre de Bruxelles, Belgium;
M. G. Velarde, Universidad Complutense de Madrid,
Spain

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

Introduction.- 1 Flow and heat transfer.- 2 Primary instability.- 3 Boundary layer approximation.- 4 Methodologies for flows at low Re.- 5 Methodologies for moderate Re.- 6 Isothermal case: 2D flow.- 7 Isothermal case: 3D flow.- 8 Interaction of 3D solitary waves.- 9 Heated films.- 10 Reactive films.- 11 Outlook.

Fields of interest

Applications of Mathematics; Classical Continuum
Physics; Appl.Mathematics/Computational
Methods of Engineering

Target groups

Research

Type of publication

Monograph

 Mathematics

Due July 2010

2010. Approx. 600 p. 180 illus. Hardcover

- **approx. € 55,00 | £50,99**
 - **approx. * € (D) 58,85 | € (A) 60,50 | sFr 91,50**
- ISBN 978-1-84882-366-2

 Mathematics

Due June 2010

2010. XXVI, 496 p. (Selected Works in Probability and
Statistics) Hardcover

- **€ 149,95 | £133,00**
 - *** € (D) 160,45 | € (A) 164,94 | sFr 229,00**
- ISBN 978-1-4419-5820-4



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G. Kemper, Technical University Munich, Germany

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

Introduction.- Part I The Algebra Geometry Lexicon.- 1 Hilbert's Nullstellensatz.- 2 Noetherian and Artinian Rings.- 3 The Zariski Topology.- 4 A Summary of the Lexicon.- Part II Dimension.- 5 Krull Dimension and Transcendence Degree.- 6 Localization.- 7 The Principal Ideal Theorem.- 8 Integral Extensions.- Part III Computational Methods.- 9 Gröbner Bases.- 10 Fibers and Images of Morphisms Revisited.- 11 Hilbert Series and Dimension.- Part IV Local Rings.- 12 Dimension Theory.- 13 Regular Local Rings.- 14 Rings of Dimension One.- References.- Notation.- Index.

Fields of interest

Algebraic Geometry; Commutative Rings and Algebras; Computational Mathematics and Numerical Analysis

Target groups

Graduate

Type of publication

Graduate/Advanced undergraduate textbook

P. Lauritzen, C. Jablonowski, M. Taylor, R. Nair (Eds.)

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

Part I: Equations of motion and some basic ideas on discretizations.- Part II. Conservation laws, finite-volume methods, remapping techniques and spherical grids.- Part III. Some aspects of atmospheric dynamical cores.

Fields of interest

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

Target groups

Research

Type of publication

Contributed volume

V. Moretti, Università di Trento, Italy

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

 Mathematics

Due June 2010

2010. 236 p. (Graduate Texts in Mathematics, Volume 256) Hardcover

- € 49,95 | £44.99
 - * € (D) 53,45 | € (A) 54,95 | sFr 77,50
- ISBN 978-3-642-03544-9



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 Mathematics

Due June 2010

2010. Approx. 300 p. (Lecture Notes in Computational Science and Engineering, Volume 73) Hardcover

- approx. € 99,95 | £90.00
 - approx. * € (D) 106,95 | € (A) 109,95 | sFr 155,50
- ISBN 978-3-642-11639-1



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 Mathematics

Pubblicazione prevista per il mese di aprile 2010

2010. 580 pagg. (UNITEXT / La Matematica per il 3+2) Brossura

- approx. € 29,76 | £26.99
 - approx. * € (D) 31,84 | € (A) 32,74 | sFr 46,50
- ISBN 978-88-470-1610-1



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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

1. Introduction to the problem.- 2. Sobolev spaces.- 3. Existence, Uniqueness of basic problems.- 4. Regularity of solution.- 5. Applications of Rellich's inequalities and generalization to boundary value problems.- 6. Sobolev spaces with weights and applications to the boundary value problems.- 7. Regularity of solutions in case of irregular domains and elliptic problems with variable coefficients.

Fields of interest

Partial Differential Equations; Functional Analysis

Target groups

Research

Type of publication

Monograph



Due June 2010

Originally published in French "Les méthodes directes en théorie des équations elliptiques" by Academia, Praha, and Masson et Cie, Editeurs, Paris, 1967

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

