A paraître January 2013

► approx. * € (D) 55,00 | € (A) 56,54 | sFr 68,50
► approx. € 51,40 | £46.99

News 1/2013

M. Aigner, G. M. Ziegler, Freie Universität, Berlin, Germany

Raisonnements divins
Quelques démonstrations mathématiques particulièrement élégantes
Cette troisième édition française propose une traduction de la quatrième édition anglaise revue et augmentée. Elle comporte cinq nouveaux chapitres, de nombreuses améliorations et corrections. Elle regroupe quelques démonstrations mathématiques choisies pour leur élégance et expose des idées brillantes, des rapprochements inattendus et des observations remarquables qui apportent un éclairage nouveau sur des problèmes fondamentaux. Selon le mathématicien Paul Erdös, qui a lui-même suggéré plusieurs des thèmes présentés, les preuves développées ici mériteraient d’être retenues pour figurer dans le Livre où Dieu aurait répertorié les démonstrations parfaites.

Features
► Un livre original et enthousiasmant qui passionnera toute personne s’intéressant aux aspects esthétiques des mathématiques ► Rassemble des démonstrations particulièrement brillantes et constitue une sorte de musée des chefs d’œuvres mathématiques ► Accessible pour des lecteurs de niveau licence ► Présentation soignée qui mêle habilement illustrations, notes explicatives et appendices permettant au lecteur d’enrichir ses connaissances

Contents
Théorie des nombres.- Géométrie.- Analyse.- Combinatoire.- Théorie des graphes.- À propos des illustrations.- Index.

Fields of interest
Number Theory; Combinatorics; Analysis

Target groups
Professional/practitioner

Product category
Manuel 1er cycle

B. Birkhäuser

B. Duplantier, CEA Saclay, Gif-sur-Yvette, France (Ed)

Time
Poincaré Seminar 2010

This eleventh volume in the Poincaré Seminar Series presents an interdisciplinary perspective on the concept of Time, which poses some of the most challenging questions in science. Five articles, written by the Fields medalist C. Villani, the two outstanding theoretical physicists T. Damour and C. Jarzynski, the leading experimentalist C. Salomon, and the famous philosopher of science H. Price, describe recent developments related to the mathematical, physical, experimental, and philosophical facets of this fascinating concept. These articles are also highly pedagogical, as befits their origin in lectures to a broad scientific audience.

Features
► Presents an interdisciplinary view of the concept of Time ► Contains a contribution of the 2010 Fields medalist Cedric Villani in English and French ► Addressed to both physicists and mathematicians

Contents

Fields of interest
Mathematics, general; Mathematical Physics; Dynamical Systems and Ergodic Theory

Target groups
Research

Product category
Contributed volume
On the Numerical Approximations of Exact Controls for Waves

This book is devoted to fully developing and comparing the two main approaches to the numerical approximation of controls for wave propagation phenomena: the continuous and the discrete. This is accomplished in the abstract functional setting of conservative semigroups. The main results of the work unify, to a large extent, these two approaches, which yield similar algorithms and convergence rates. The discrete approach, however, gives not only efficient numerical approximations of the continuous controls, but also ensures some partial controllability properties of the finite-dimensional approximated dynamics.

Features
- Devoted to fully developing and comparing continuous and the discrete approaches to the numerical approximation of controls for wave propagation phenomena
- Provides convergence results for the discrete wave equation when discretized using finite differences and proves the convergence of the discrete wave equation with non-homogeneous Dirichlet conditions

Contents
1. Numerical approximation of exact controls for waves
2. The discrete 1-d wave equation
3. Convergence of the discrete wave equation with non-homogeneous Dirichlet conditions
4. Convergence for homogeneous boundary conditions
5. Further comments and open problems

Fields of Interest
Approximations and Expansions; Partial Differential Equations; Systems Theory, Control

Target Groups
Research

Product Category
Brief

Due January 2013
2013. XV, 120 p. illus., 1 in color. (SpringerBriefs in Mathematics) Softcover
- € (D) 53.49 | € (A) 54.99 | sFr 67.00
- € 49.99 | £44.99
ISBN 978-1-4614-5807-4

An Introduction to the Regularity Theory for Elliptic Systems, Harmonic Maps and Minimal Graphs

This volume deals with the regularity theory for elliptic systems. We may find the origin of such a theory in two of the problems posed by David Hilbert in his celebrated lecture delivered during the International Congress of Mathematicians in 1900 in Paris: 19th problem: Are the solutions to regular problems in the Calculus of Variations always necessarily analytic? 20th problem: does any variational problem have a solution, provided that certain assumptions regarding the given boundary conditions are satisfied, and provided that the notion of a solution is suitably extended? During the last century these two problems have generated a great deal of work, usually referred to as regularity theory, which makes this topic quite relevant in many fields and still very active for research. However, the purpose of this volume, addressed mainly to students, is much more limited.

Features
- Covers both classical and recent topics
- Very few prerequisites
- Excellent introduction to the subject

Contents
1 Harmonic functions
2 Direct methods
3 Hilbert space methods
4 L2-regularity: the Caccioppoli inequality
5 Schauder estimates
6 Some real analysis
7 Lp-theory
8 The regularity problem in the scalar case
9 Partial regularity in the vector-valued case
10 Harmonic maps
11 A survey of minimal graphs

Field of Interest
Partial Differential Equations

Target Groups
Research

Product Category
Graduate/Advanced undergraduate textbook

Due March 2013
2013. Approx. 450 p. 65 illus., 15 in color. Hardcover
- approx. € (D) 106.95 | € (A) 109.95 | sFr 133.50
- € 99.95 | £90.00
ISBN 978-3-642-35328-4

- € (D) 25.68 | € (A) 26.40 | sFr 32.00
- € 24.00 | £19.99
L. Goss, CNR, Rome, Italy

Computing Qualitatively Correct Approximations of Balance Laws
Exponential-Fit, Well-Balanced and Asymptotic-Preserving

Contents

Fields of interest
Computational Mathematics and Numerical Analysis; Partial Differential Equations; Applications of Mathematics

Target groups
Research

Product category
Monograph

Due January 2013
2013. XX, 340 p. (SMAI Springer Series, Volume 2) Hardcover
➤ $101.60 | £104.49 | sFr 126.50
➤ $94.99 | £85.50

Q. He, University of California, Irvine, CA, USA; L. Y. Wang, G. G. Yin, Wayne State University, Detroit, MI, USA

System Identification Using Regular and Quantized Observations
Applications of Large Deviations Principles

This brief presents characterizations of identification errors under a probabilistic framework when output sensors are binary, quantized, or regular. By considering both space complexity in terms of signal quantization and time complexity with respect to data window sizes, this study provides a new perspective to understand the fundamental relationship between probabilistic errors and resources, which may represent data sizes in computer usage, computational complexity in algorithms, sample sizes in statistical analysis and channel bandwidths in communications.

Features
➤ Presents characterizations of identification errors under a probabilistic framework when output sensors are binary, quantized, or regular. — First book devoted to large deviations to system identification. — Application oriented

Fields of interest
Systems Theory; Control; Control; Probability Theory and Stochastic Processes

Target groups
Research

Product category
Brief

Due January 2013
2013. X, 95 p. 17 illus., 16 in color. (SpringerBriefs in Mathematics) Softcover
➤ $53.49 | £44.99 | sFr 67.00
➤ $49.99 | £44.99
ISBN 978-1-4614-6291-0

E. Hitzer, International Christian University, Tokyo, Japan; S. J. Sangwine, University of Essex, Colchester, UK (Eds)

Quaternion and Clifford Fourier Transforms and Wavelets

Contents

Fields of interest
Number Theory; Linear and Multilinear Algebras, Matrix Theory; Numerical Analysis

Target groups
Research

Product category
Contributed volume

Due March 2013
2013. VIII, 350 p. (Trends in Mathematics) Hardcover
➤ approx. $101.60 | £104.45 | sFr 126.50
➤ approx. $94.95 | £85.50
ISBN 978-3-0348-0602-2

Birkhäuser
G. F. Lawler, University of Chicago, IL, USA

Intersections of Random Walks

A central study in Probability Theory is the behavior of fluctuation phenomena of partial sums of different types of random variable. One of the most useful concepts for this purpose is that of the random walk which has applications in many areas, particularly in statistical physics and statistical chemistry. Originally published in 1991, Intersections of Random Walks focuses on and explores a number of problems dealing primarily with the nonintersection of random walks and the self-avoiding walk. Many of these problems arise in studying statistical physics and other critical phenomena. Topics include: discrete harmonic measure, including an introduction to diffusion limited aggregation (DLA); the probability that independent random walks do not intersect; and properties of walks without self-intersections. The present softcover reprint includes corrections and addenda from the 1996 printing, and makes this classic monograph available to a wider audience.

Features

► Affordable reprint of a classic monograph
► Topics covered include: discrete harmonic measure; the probability that independent random walks do not intersect; and properties of walks without self-intersections
► Includes the corrections and addendum from the second printing

Contents

Simple Random Walk.- Harmonic Measure.- Intersection Probabilities.- Four Dimensions.- Two and Three Dimensions.- Self-Avoiding Walks.- Loop-Erased walk.- Recent Results.

Fields of interest

Probability Theory and Stochastic Processes; Statistical Physics, Dynamical Systems and Complexity; Statistics for Engineering, Physics, Computer Science, Chemistry and Earth Sciences

Due March 2013

2013. CDVIII, 10 p. 96 illus., 50 in color. (Lecture Notes in Mathematics / Mathematical Biosciences Subseries, Volume 2071) Softcover

► * € (D) 74,85 | € (A) 76,95 | sFr 93,50
► * € 69,95 | £62.99
ISBN 978-3-642-35496-0

M. A. Lewis, University of Alberta, Edmonton, AB, Canada; P. K. Maini, University of Oxford, UK; S. V. Petrovskii, University of Leicester, UK (Eds)

Dispersal, Individual Movement and Spatial Ecology

A Mathematical Perspective

Dispersal of plants and animals is one of the most fascinating subjects in ecology.

Contents


Fields of interest

Mathematical and Computational Biology; Applications of Mathematics; Theoretical Ecology/ Statistics

Target groups

Research

Product category

Contributed volume
B. Maury, University of Paris Sud, Paris, France
The Respiratory System in Equations

This book proposes an introduction to the mathematical modeling of the respiratory system. A detailed introduction on the physiological aspects makes it accessible to a large audience without any prior knowledge on the lung. Different levels of description are proposed, from the lumped models with a small number of parameters (Ordinary Differential Equations), up to infinite dimensional models based on Partial Differential Equations. Besides these two types of differential equations, two chapters are dedicated to resistive networks, and to the way they can be used to investigate the dependence of the resistance of the lung upon geometrical characteristics. The theoretical analysis of the various models is provided, together with state-of-the-art techniques to compute approximate solutions, allowing comparisons with experimental measurements. The book contains several exercises, most of which are accessible to advanced undergraduate students.

Features
► Numerous exercises helping the reader to learn quickly ► Online programs allowing the reader to perform his own computations ► No prior knowledge on physiology required

Contents

Fields of interest
Ordinary Differential Equations; Fluid- and Aerodynamics; Pneumology/Respiratory System

Target groups
Graduate

Product category
Monograph

A. Moktefi, Université de Strasbourg, France; S.-J. Shin, Yale University, New Haven, CT, USA (Eds)
Visual Reasoning with Diagrams

Logic, the discipline that explores valid reasoning, does not need to be limited to a specific form of representation but should include any form as long as it allows us to draw sound conclusions from given information.

Features
► Investigates the logical aspects of visualization in quantum field theory and gravity ► Addresses the increasingly important topic of visualizations in our complex modern world ► Of interest for mathematicians, logicians, philosophers, cognitive and computer scientists

Contents

Fields of interest
Mathematical Logic and Foundations; Visualization; Logic

Target groups
Research

Product category
Contributed volume

A. Nagurney, University of Massachusetts Amherst, MA, USA; M. Yu, University of Portland, OR, USA; A. H. Masoumi, University of Massachusetts Amherst, MA, USA; L. S. Nagurney, University of Hartford, CT, USA
Networks Against Time
Supply Chain Analytics for Perishable Products

Despite significant achievements, the discipline of supply chain management is still unable to satisfactorily handle many practical real-world challenges. The authors of Networks Against Time claim that a unified supply chain network analytics framework is needed which should be able to handle optimization and competitive behavior while also maintain relevance to many industrial sectors in which perishable products are prominent, from healthcare to food and from fashion apparel to technology. This Brief provides a wide range of critical supply chain problems which are modeled as generalized networks.

Features
► Captures the full scope of supply chain network activities like production, storage, transportation and distribution ► Case studies demonstrate the application of models and algorithms to real-world sectors ► Graphically depicts network structures of distinct supply chains comparisons across different application domains

Contents

Fields of interest
Operations Research, Management Science; Game Theory; Economics, Social and Behavior Sciences; Mathematical Modeling and Industrial Mathematics

Target groups
Research

Product category
Brief

Due December 2012

Due March 2013
2013. XVI, 212 p. 113 illus., 12 in color. (Studies in Universal Logic) Softcover ► * € (D) 53,49 | € (A) 54,99 | sFr 67,00 ► € 49,99 | £44.99 ISBN 978-3-0348-0599-5

Due January 2013
Class Field Theory
-The Bonn Lectures- Edited by Alexander Schmidt

The present manuscript is an improved edition of a text that first appeared under the same title in Bonner Mathematische Schriften, no.26, and originated from a series of lectures given by the author in 1965/66 in Wolfgang Krull's seminar in Bonn. Its main goal is to provide the reader, acquainted with the basics of algebraic number theory, a quick and immediate access to class field theory. This script consists of three parts, the first of which discusses the cohomology of finite groups. The second part discusses local class field theory, and the third part concerns the class field theory of finite algebraic number fields.

Features
► Clear presentation  ► Quick and immediate access to the subject  ► A classic (established and prominent German original)

Contents
Cohomology of Finite Groups.- Local Class Field Theory.- Global Class Field Theory.

Fields of interest
Number Theory; Algebra

Target groups
Upper undergraduate

Product category
Graduate/Advanced undergraduate textbook

The Sherrington-Kirkpatrick Model

The celebrated Parisi solution of the Sherrington-Kirkpatrick model for spin glasses is one of the most important achievements in the field of disordered systems. Over the last three decades, through the efforts of theoretical physicists and mathematicians, the essential aspects of the Parisi solution were clarified and proved mathematically. The core ideas of the theory that emerged are the subject of this book, including the recent solution of the Parisi ultrametricity conjecture and a conceptually simple proof of the Parisi formula for the free energy. The treatment is self-contained and should be accessible to graduate students with a background in probability theory, with no prior knowledge of spin glasses.

Features
► Presents many central ideas of the mathematical theory of the Sherrington-Kirkpatrick model in detail  ► Contains a fundamental breakthrough in this subject by the author  ► Accessible to graduate students working in probability theory or statistical mechanics

Contents

Fields of interest
Probability Theory and Stochastic Processes; Mathematical Physics; Mathematical Methods in Physics

Target groups
Research

Product category
Monograph
Global Wellposedness of Nonlinear Evolutionary Fluid Equations

Features
- Presents recent as well as unpublished results
- Each chapter closes with bibliographic comments
- Acquaints the reader with the main ideas of the basic theories and methods

Contents

Fields of interest
Mathematical Physics; Partial Differential Equations; Mathematical Methods in Physics

Target groups
Research

Product category
Monograph

Optimal Investment

Readers of this book will learn how to solve a wide range of optimal investment problems arising in finance and economics. Starting from the fundamental Merton problem, many variants are presented and solved, often using numerical techniques that the book also covers. The final chapter assesses the relevance of many of the models in common use when applied to data.

Features
- Presents the main methods for solving stochastic optimal control problems arising in finance
- Through a large number of worked problems, illustrates how to use a combination of analytic and numerical techniques to actually find a solution even when none is available in closed form
- Critiques the usefulness of theory in the light of stylized facts of asset return

Contents

Fields of interest
Quantitative Finance; Finance/Investment/Banking; Numerical Analysis

Target groups
Professional/practitioner

Product category
Brief

Problem-solving Methods in Combinatorics

An approach to olympiad problems

Every year there is at least one combinatorics problem in each of the major international mathematical olympiads. These problems can only be solved with a very high level of wit and creativity. This book explains all the problem-solving techniques necessary to tackle these problems, with clear examples from recent contests. It also includes a large problem section for each topic, including hints and full solutions so that the reader can practice the material covered in the book. The material will be useful not only to participants in the olympiads and their coaches but also in university courses on combinatorics.

Features
- Explains the tools necessary tools to solve olympiad combinatorics type problems, using clear examples from recent contests
- Includes over 120 problems with hints and full, sometimes multiple, solutions
- May be used by olympiad students and coaches but is also useful for university courses on combinatorics
- Almost completely self-contained, requiring very little technical knowledge

Contents
Introduction.- 1 First concepts.- 2 The pigeonhole principle.- 3 Invariants.- 4 Graph theory.- 5 Functions.- 6 Generating Functions.- 7 Partitions.- 8 Hints for the problems.- 9 Solutions to the problems.- Notation.- Further reading.- Index.

Field of interest
Combinatorics

Target groups
Upper undergraduate

Product category
Graduate/Advanced undergraduate textbook