

NEW & FORTHCOMING MATHEMATICS 2011

:: Notable Title

THE THERMODYNAMICS OF QUANTUM YANG-MILLS THEORY

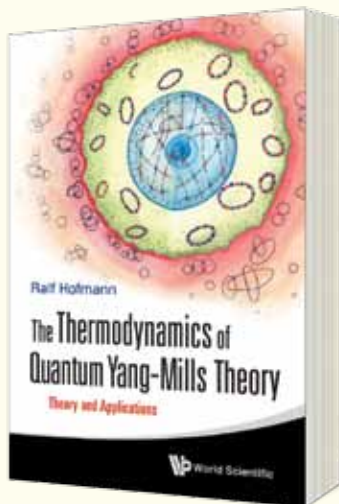
Theory and Applications

by **Ralf Hofmann**

(Heidelberg University, Germany)

This book is the first on the newly emerging subject of quantum Yang-Mills theory that may serve advanced students and researchers learning the thermodynamically-grounded analytic approach to nonperturbative gauge theory, and its applications to a variety of terrestrial and astrophysical systems.

400pp Aug 2011
978-981-4329-04-0 US\$96 £60
978-981-4329-97-2(ebook) US\$125



:: Highly Recommend

A WALK THROUGH COMBINATORICS An Introduction to Enumeration and Graph Theory Third Edition

by **Miklós Bóna** (University of Florida, USA)

Review of the Second Edition:

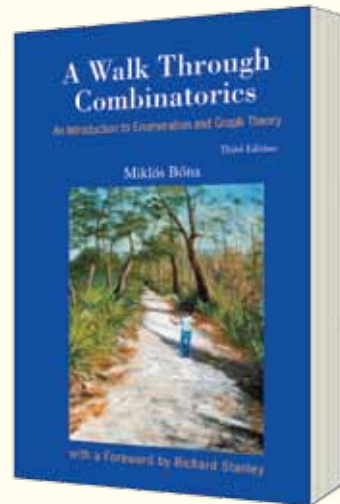
"Bóna's book is an excellent choice for anyone who wants an introduction to this beautiful branch of mathematics ... Plentiful examples illustrate each of the topics included in the book. Bóna does a supreme job of walking us through combinatorics."

Choice

This is a textbook for an introductory combinatorics course lasting one or two semesters. The basic topics discussed are: the twelvefold way, cycles in permutations, the formula of inclusion and exclusion, the notion of graphs and trees, matchings, Eulerian and Hamiltonian cycles, and planar graphs.

The selected advanced topics are: Ramsey theory, pattern avoidance, the probabilistic method, partially ordered sets, the theory of designs (new to this edition), enumeration under group action (new to this edition), generating functions of labeled and unlabeled structures and algorithms and complexity.

564pp Mar 2011
978-981-4335-23-2 US\$110 £72



:: Editor's Pick

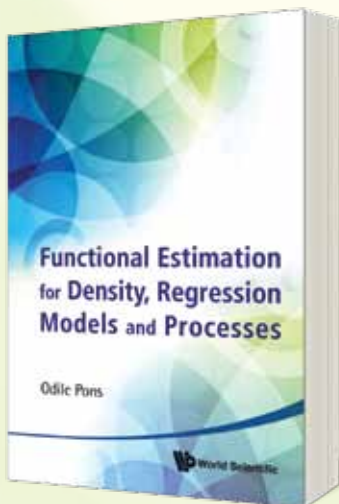
FUNCTIONAL ESTIMATION FOR DENSITY, REGRESSION MODELS AND PROCESSES

by **Odile Pons** (INRA, France)

This book presents a unified approach on nonparametric estimators for models of independent observations, jump processes and continuous processes.

Contents: Introduction; Kernel Estimator of a Density; Kernel Estimator of a Regression Function; Limits for the Varying Bandwidths Estimators; Nonparametric Estimation of Quantiles; Nonparametric Estimation for Stochastic Processes; Estimation in Semi-Parametric Regression Models; Diffusions Processes; Applications to Time Series.

200pp Mar 2011
978-981-4343-73-2 US\$75 £49



HIGHLIGHTS

ANALYTICAL MECHANICS

A Comprehensive Treatise on the Dynamics of Constrained Systems
Reprint Edition

by **John G Papastavridis**
(Georgia Institute of Technology, USA)

Pg 7

PROCEEDINGS OF THE INTERNATIONAL CONGRESS OF MATHEMATICIANS 2010

(ICM 2010) (In 4 Volumes)
Hyderabad, India, 19-27 August 2010

edited by **Rajendra Bhatia**, co-editors:

Arup Pal, G Rangarajan, V Srinivas & M Vanninathan

Pg 9

World Scientific Series in 20th Century Mathematics – Vol. 10

FIFTY YEARS OF MATHEMATICAL PHYSICS

Selected Works of Ludvig Faddeev

edited by **Molin Ge** (Chem Institute of Mathematics, China & Chinese Academy of Science, China) & **Antti J Niemi** (Uppsala University, Sweden & CNRS/Tours, France)

Pg 11

ALGEBRA & NUMBER THEORY

SELECTED WORKS OF GEORGE E ANDREWS

(With Commentary)

by **George E Andrews** (*Pennsylvania State University, USA*) & edited by **Andrew V Sills** (*Georgia Southern University, USA*)



George E Andrews is the Evan Pugh Professor of Mathematics at Pennsylvania State University. He is also President of the American Mathematical Society (AMS) for the period of 2009–2011. He is a world pioneer in partitions and q -series and his contributions include more than 250 scientific papers and several books on number theory and the theory of partitions. In 1976 he discovered Ramanujan's Lost Notebook, a finding which changed the shape of modern q -series research.

Besides giving readers access to George Andrews' most important papers, this volume also provides his background commentary and comprehensive assessment of years of research and findings within the field of integer partitions.

Contents: The Geometry of Numbers; q -Series; Partition Identities; Plane Partitions; Combinatorics, Fibonacci Numbers, and Computers; Number Theory; Surveys; Education, History, etc.

1100pp **Jan 2012**
978-1-84816-666-0 **US\$298** **£185**
978-1-84816-667-7(ebook) **US\$387**

COMPLEX ANALYSIS IN FREE PROBABILITY THEORY

by **Hari Bercovici** & **John Williams** (*Indiana University, USA*)

The book will describe those results in free probability which rely on analytic functions of one variable. These results include free versions of many known results about the addition and multiplication of random variables, including characterizations of infinite divisibility and weak limit theorems. The complex analysis necessary for these developments will be presented to the extent that it exceeds standard graduate presentations of the subject.

Contents: Free Convolutions; Free Multiplicative Convolution on the Circle; Free Additive Convolution on the Real Line; Free Multiplicative Convolution on the Positive Half Line; Further Developments.

250pp **Dec 2011**
978-981-4335-56-0 **US\$68** **£42**
978-981-4335-57-7(ebook) **US\$88**

GALOIS ALGEBRAS AND THEIR REPRESENTATIONS

by **Vyacheslav Futorny** (*University of São Paulo, Brazil*) & **Serge Ovsienko** (*Kiev University, Ukraine*)

The book provides a comprehensive overview of the theory of Galois algebras and their representations developed by the authors. The book will be of interests to those who specialize in Lie theory, Representation theory and Ring theory.

Contents: Skew Monoid Rings; Category of Balanced Bimodules and Hecke Algebras; Galois Rings and Galois Orders; Examples; Gelfand–Tsetlin Modules Over Galois Rings; Fibers of Characters; Gelfand–Kirillov Conjecture for Galois Rings; Finite W -Algebras of Type A as Galois Rings; Gelfand–Tsetlin Modules Over Finite W -Algebras; Gelfand–Kirillov Conjecture for Finite W -Algebras; Example of the Universal Enveloping Algebra of $\mathfrak{gl}(n)$.

200pp **Oct 2011**
978-981-4299-22-0 **US\$68** **£42**

THE SHAPE OF ALGEBRA

A Visual Exploration of Elementary Algebra and Beyond (With CD-ROM)

by **Gabriel Katz** (*Massachusetts Institute of Technology, USA*) & **Vladimir Nodel'man** (*Holon Institute of Technology, Israel*)

Contents: Introduction — Maps upon Maps; Maps, Models, and the Coordinate Plane; The Universe of Quadratic Polynomials; The Complex Numbers; The Geometry of Complex Linear Polynomial Maps; Complex Polynomial Maps, Closed Plane Curves and their Invariants; Experimenting with the Geometry of Complex Polynomial Maps of Degrees Two and Three; The Old Art of Solving Cubic Equations and the New Science; Complex Polynomial Maps of Higher Degrees and the Fundamental Theorem of Algebra; Local and Global Geometry of Complex Polynomial Maps; The Fundamental Theorem and the Complex Viète Map; **Appendices:** Estimating Polynomial Expressions; More about the Taylor Formula for Polynomials; The Geometry of Discriminants; Line Integrals and an Analytical Proof of the Loop Theorem; Deformations of Complex Polynomials and the Braids.

500pp **Aug 2011**
978-981-4313-59-9 **US\$77** **£53**

NEW DEVELOPMENTS IN THE ADDITIVE THEORY OF PRIME NUMBERS

by **Jianya Liu** & **Tao Zhan** (*Shandong University, China*)

In recent years, new ideas using the circle method, sieves, and exponential sums have been incorporated into the Waring–Goldbach problem, encouraging remarkable advances. The purpose of this book is to introduce some of these new ideas, illustrated by dealing with the Waring–Goldbach problem for lower degrees.

Contents: The Riemann Zeta-Function and Dirichlet L-Functions; Sums of Two Squares, and of Two Squares of Primes; The Circle Method in the Waring–Goldbach Problem; The Large Sieve; The Major Arcs; Exponential Sums Over Primes; Sums of Squares of Primes; The Major Arcs, II; Introduction to Sieve Methods; Exponential Sums Over Primes, II; Sums of Cubes of Primes; Sums of Forth Powers of Primes; Sums of Fifth Powers of Primes; High Powers.

200pp **Jul 2011**
978-981-277-592-4 **US\$73** **£51**
978-981-277-593-1(ebook) **US\$95**

Series on Knots and Everything

HOPF ALGEBRAS

by **David E Radford** (*University of Illinois at Chicago, USA*)

The book provides a detailed account of basic coalgebra and Hopf algebra theory with emphasis on Hopf algebras which are pointed, semisimple, quasitriangular, or are of certain other quantum groups. It is intended to be a graduate text as well as a research monograph.

Contents: Coalgebras; Representations of Coalgebras; Filtrations and Gradings on Coalgebras; Bialgebras; The Convolution Algebra; Hopf Algebras; Hopf Modules and Co-Hopf Modules; Hopf Algebras as Modules Over Their Hopf Subalgebras; Integrals; Actions by Bialgebras and Hopf Algebras; Quasitriangular Bialgebras and Hopf Algebras; The Drinfel'd Double; Co-Quasitriangular Bialgebras and Hopf Algebras; Pointed Hopf Algebras; Finite-Dimensional Hopf Algebras Over a Field of Characteristic Zero.

500pp **Jul 2011**
978-981-4335-99-7 **US\$98** **£61**

Series on Number Theory & Its Applications – Vol. 3

**MULTI-DIMENSIONAL LANGLANDS
FUNCTORIALITY PRINCIPLE****Notes on M M Kapranov's Work**by **Kâzım İlhan İkedâ** (*Yeditepe University, Istanbul, Turkey*)

This book presents a detailed exposition of the arithmetic side of Kapranov's idea. It aims at providing an introductory, detailed and up-to-date study of Kapranov's seminal work, "Analogies between topological quantum field theory and Langlands correspondence", published in 1995, which is the first paper in literature discussing the formal framework and the formulation of higher-dimensional Langlands correspondence, together with closely related recent works of Kazhdan, Parshin and others. This book will be of interest to researchers and graduate students in number theory and related areas.

Contents: Introduction — Review of Langlands Functoriality Principle; Lang Density Theorem; Formulation of Non-Abelian Multi-dimensional Reciprocity Laws; Review of K -Theoretic Class Field Theory; Kapranov Reciprocity Principle; Kapranov Functoriality Principle.

200pp	Jul 2011
978-981-283-831-5	US\$65 £45
978-981-283-832-2(ebook)	US\$85

ABSTRACT ALGEBRA**An Introduction to Groups, Rings and Fields**by **Clive Reis** (*University of Western Ontario, Canada*)

This book is appropriate for second to fourth year undergraduates. In addition to the material traditionally taught at this level, the book contains several applications. It is hoped that these applications will help the reader achieve a better grasp of the rather abstract ideas presented and convince him/her that pure mathematics, in addition to having an austere beauty of its own, can be applied to solving practical problems.



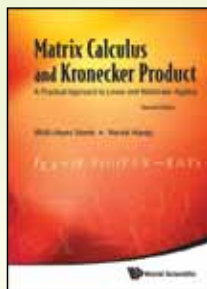
Contents: Logic and Proofs; Set Theory; Cartesian Products and Relations, Maps and Binary Operations; The Integers with a Thorough Treatment of Congruences; Groups (including the Sylow Theorems); Permutation Groups; Rings, Integral, Domains and Fields; Latin Squares; Polya–Burnside Enumeration; Group Codes; Polynomial Codes; and other chapters.

520pp	Mar 2011
978-981-4335-64-5	US\$108 £67
978-981-4340-28-1(pbk)	US\$58 £36

**MATRIX CALCULUS AND
KRONECKER PRODUCT****A Practical Approach to Linear and Multilinear Algebra
Second Edition**by **Willi-Hans Steeb & Yorick Hardy**
(*University of Johannesburg, South Africa*)

This book provides a self-contained and accessible introduction to linear and multilinear algebra. The book is well suited for pure and applied mathematicians as well as theoretical physicists and engineers.

Contents: Matrix Calculus; Kronecker Product; Applications; Tensor Product; Braid-like Relations; Clebsch–Gordan Expansion; Nearest Kronecker Product; Clifford and Pauli Group; Universal Enveloping Algebra; Computer Algebra Implementation.



322pp	Mar 2011
978-981-4335-31-7	US\$84 £55

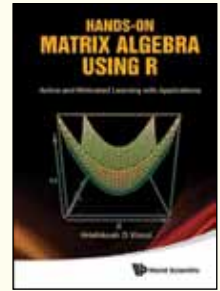
HANDS-ON MATRIX ALGEBRA USING R**Active and Motivated Learning with Applications**by **Hrshikesh D Vinod** (*Fordham University, USA*)

This is the first book of its kind which teaches matrix algebra, allowing the student to learn the material by actually working with matrix objects in modern computer environment of R. Instead of a calculator, R is a vastly more powerful free software and graphics system.

The book provides a comprehensive overview of matrix theory without being bogged down in proofs or tedium. The book does not shy away from advanced topics, especially the ones with practical applications.

Contents: R Preliminaries; Elementary Geometry and Algebra Using R; Vector Spaces; Matrix Basics and R Software; Determinant and Singularity; The Rank and Trace of a Matrix; Matrix Inverse and Solution of Linear Equations.

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978-981-4313-69-8(pbk)	US\$38 £24



Series in Algebra – Vol. 11

**RINGS RELATED TO
STABLE RANGE CONDITIONS**by **Huanyin Chen** (*Hangzhou Normal University, China*)

This monograph is concerned with exchange rings in various conditions related to stable range. Diagonal reduction of regular matrices and cleanness of square matrices are also discussed. Readers will come across various topics: cancellation of modules, comparability of modules, cleanness, monoid theory, matrix theory, K -theory, topology, amongst others. This is a first-ever book that contains many of these topics considered under stable range conditions. It will be of great interest to researchers and graduate students involved in ring and module theories.



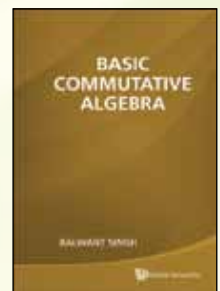
680pp	Jan 2011
978-981-4329-71-2	US\$148 £92
978-981-4329-72-9(ebook)	US\$192

BASIC COMMUTATIVE ALGEBRAby **Balwant Singh** (*Indian Institute of Technology Bombay, India & UM-DAE Centre for Excellence in Basic Sciences, India*)

This textbook, set for a one or two semester course in commutative algebra, provides an introduction to commutative algebra at the postgraduate and research levels.

Contents: Rings and Ideals; Modules and Algebras; Polynomial and Power Series Rings; Homological Tools I; Tensor, Symmetric and Exterior Algebras; Finiteness Conditions; Primary Decomposition; Filtrations and Completions; Numerical Functions; Principal Ideal Theorem; Integral Extensions; Normal Domains; Transcendental Extensions; Affine Algebras; Derivations and Differentials; Valuation Rings and Valuations; Homological Tools II; Homological Dimensions; Depth; Regular Rings; Divisor Class Groups.

404pp	Jan 2011
978-981-4313-61-2	US\$99 £64
978-981-4313-62-9(pbk)	US\$46 £30



ORDINARY DIFFERENTIAL EQUATIONS

Problem Solver

by **David N Cheban** (*State University of Moldova, Moldova*)

This book is written on the basis of more than 30 years of the author's teaching experience on practical and laboratory occupations on the course of ordinary differential equations with the students of the State University of Moldova. It's compact and well illustrated. Containing over 400 solved examples and problems, its main objective is to promote a deep understanding on the theory, develop concrete mathematical thinking of students, nurture the skills in finding solutions to the problems, and understand their physical essence.

415pp Dec 2011
978-981-4335-95-9 US\$69 £43

NAVIER-STOKES EQUATIONS IN PLANAR DOMAINS

by **Matania Ben-Artzi** (*Hebrew University of Jerusalem, Israel*),
Jean-Pierre Croisille (*Université Paul Verlaine - Metz, France*), &
Dalia Fishelov (*Tel-Aviv Academic College of Engineering, Israel*)

This book provides an up-to-date account of recent developments in vorticity theory. It deals with the classical Navier-Stokes system of equations governing the planar flow of incompressible, viscid fluid. It is a first-of-its-kind book, devoted to all aspects of the study of such flows, ranging from theoretical to numerical, including detailed accounts of classical test problems such as "driven cavity" and "double-driven cavity".

260pp May 2011
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978-1-84816-276-1(ebook) US\$103

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978-981-4324-03-8(ebook) US\$62

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An Introduction to Harmonic Analysis and Hilbert Spaces of Holomorphic Functions

by **Gestur Olafsson** (*Louisiana State University, USA*)

The main topic of this lecture note is the interplay between real and complex analysis using the heat equation and the Segal-Bargmann transform. This is the only available textbook where all of those aspects of the theory are discussed. The first part of the text is on the level of advanced undergraduate students and beginning graduate students. The second half is more advanced and leads the reader into the theory of Hilbert spaces of holomorphic functions and abstract harmonic analysis.

Contents: Basic Analysis; The Segal-Bargmann Transform on V ; Infinite Dimensional Analysis; Connection to Representation Theory; Riemannian Symmetric Spaces; The Heat Equation associated to Finite Reflection Groups.

300pp Jul 2011
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250pp Jul 2011
978-981-277-594-8 US\$65 £45

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An Introduction to Basic Concepts, Results and Applications (Second Edition)

by **Ioan I Vrabie** (*"Al I Cuza" University of Iasi, Romania & Romanian Academy, Romania*)

Reviews of the First Edition:

"This book is a nice contribution to existing literature on differential equations and can be warmly recommended as additional reading for students in mathematics, physics and engineering who need solid theoretical background in differential equations."

Zentralblatt MATH

This book presents, in a unitary frame and from a new perspective, the main concepts and results of one of the most fascinating branches of modern mathematics, namely differential equations, and offers the reader another point of view concerning a possible way to approach the problems of existence, uniqueness, approximation, and continuation of the solutions to a Cauchy problem.

Contents: Generalities; The Cauchy Problem; Approximation Methods; Systems of Linear Differential Equations; Elements of Stability; Prime Integrals; Extensions and Generalizations; Auxiliary Results.

450pp Jun 2011
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For Science and Engineering Students

by **Sheng Gong & Youhong Gong**

(*University of Science and Technology of China, China*)

This book is based on Professor Sheng Gong's 42 years of teaching experience along with a touch of applications of Calculus in other fields such as computer science, engineering. Science students will benefit from the unique way of illustrating theorems in Calculus and also perceive Calculus as a whole instead of a combination of separate topics. The practical examples provided in the book bring motivation to students to learn Calculus.

550pp Jun 2011
978-981-4291-48-4 US\$88 £58
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World Scientific Series on Nonlinear Science, Series A

QUALITATIVE AND ASYMPTOTIC ANALYSIS OF DIFFERENTIAL EQUATIONS WITH RANDOM PERTURBATIONS

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350pp **Jun 2011**
978-981-4329-06-4 **US\$98 £61**
978-981-4329-07-1(ebook) **US\$127**

HOW TO MEASURE THE INFINITE Numerosities and Nonstandard Analysis

by **Vieri Benci & Mauro Di Nasso** (Università di Pisa, Italy)

This book provides a comprehensive exposition of a new way of counting (countable) infinite sets, in particular, numerosities that maintain the ancient Aristotle's principle: "The whole is larger than its parts." It also contains an original introduction to nonstandard analysis. The basic principles are presented in an elementary way by using the ordinary language of mathematics. This is to be contrasted with other introductions, where technical notions from logic are used which are not familiar to most mathematicians.

200pp **Jun 2011**
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This book contains a complete and well organized exposition of the entire theory on differentiation and integration of functions in several real variables (all types of integrals, multiple, line and surface and improper integrals are discussed). It's rich in appropriate examples, exercises and problems with detailed solutions and /or hints.

Contents: Basic Features of Euclidean Space R^n ; Functions on Euclidean Spaces; Differential Calculus in Several Variables; Integral Calculus in Several Variables; Change of Variable Formula, Improper Multiple Integrals; Line and Surface Integrals; Elements of Ordinary and Partial Differential Equations; Introduction to Calculus of Variations.

600pp **Mar 2011**
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978-981-4299-27-5(pbk) **US\$50 £31**

APPLIED ANALYSIS

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by **Takasi Senba** (Kyushu Institute of Technology, Japan) & **Takashi Suzuki** (Osaka University, Japan)

Review of the First Edition

"One good feature of the book is the rather large bibliography of mostly research papers that pertain to the applications mentioned in the textual material. This feature should be a huge help in understanding the ideas and concepts presented and soften some of the abstractions ... most topics are covered in an introductory way and serve to tie together this body of mathematical methods that can serve the natural sciences."

500pp **Mar 2011**
978-1-84816-652-3 **US\$98 £61**



Mathematical Reviews

Series in Real Analysis – Vol. 12

HENSTOCK–KURZWEIL INTEGRATION ON EUCLIDEAN SPACES

by **Tuo Yeong Lee** (Nanyang Technological University, Singapore)

This book presents an introduction of the multiple Henstock–Kurzweil integral. Along with the classical results, this book contains some recent developments connected with measures, multiple integration by parts, and multiple Fourier series. The book can be understood with a prerequisite of advanced calculus.

300pp **Mar 2011**
978-981-4324-58-8 **US\$90 £56**
978-981-4324-59-5(ebook) **US\$117**

CALCULUS

Theory and Applications

by **Kenneth Kuttler** (Brigham Young University, USA)

Volume 1

This is a book on single variable calculus including most of the important applications of calculus. It also includes proofs of all theorems presented, either in the text itself, or in an appendix.

Contents: A Short Review of Precalculus; Functions; Derivatives; Some Important Special Functions; Properties of Derivatives; Applications of Derivatives; Antiderivatives; Applications of Antiderivatives; Other Differential Equations; The Integral; Infinite Series; Fundamentals; Vector Products; Some Curvilinear Coordinate Systems.

500pp **Dec 2010**
978-981-4324-26-7 **US\$89 £58**
978-981-4329-69-9(pbk) **US\$42 £27**

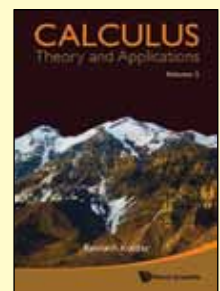
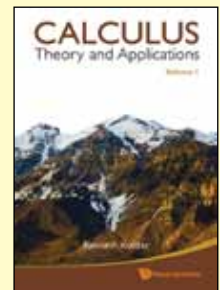
Volume 2

This is a book on many variable calculus. It also includes a sufficient introduction to linear algebra to allow the accurate presentation of many variable calculus.

Contents: Matrices and Linear Transformations; Determinants; Spectral Theory; Vector Valued Functions; Vector Valued Functions of One Variable; Motion on a Space Curve; Functions of Many Variables; The Derivative of a Function of Many Variables; Optimization; The Riemann Integral on R^n ; The Integral in Other Coordinates; The Integral on Two Dimensional Surfaces in R^3 ; Calculus of Vector Fields; Stokes and Green's Theorems.

424pp **Jan 2011**
978-981-4324-27-4 **US\$92 £57**
978-981-4329-70-5(pbk) **US\$45 £28**

Set
978-981-4335-71-3 **US\$156 £101**
978-981-4335-72-0(pbk) **US\$76 £49**



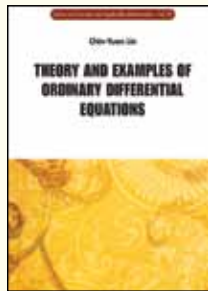
NEW & FORTHCOMING MATHEMATICS 2011

Series on Concrete and Applicable Mathematics – Vol. 10

THEORY AND EXAMPLES OF ORDINARY DIFFERENTIAL EQUATIONS

by **Chin-Yuan Lin** (*National Central University, Taiwan*)

This book presents a complete theory of ordinary differential equations, with many illustrative examples and interesting exercises. A rigorous treatment is offered with clear proofs for the theoretical results and with detailed solutions for the examples and problems.



Contents: Linear Equations; Systems of Linear First Order Equations; Power Series Solutions; Adjoint Operators and Nonhomogeneous Boundary Value Problems; Green Functions; Eigenfunction Expansions; Long Time Behavior of Systems of Differential Equations; Existence and Uniqueness Theorems.

556pp Jan 2011
978-981-4307-12-3 US\$77 £53

APPROXIMATION THEORY

WAVELET ANALYSIS AND ITS APPLICATIONS

Numerical Methods, Computer Graphics and Economics

by **Tian-Xiao He** (*Illinois Wesleyan University, USA*) & **En-Bing Lin** (*Central Michigan University, USA*)

This is an introductory, self-contained book on wavelet analysis and its applications, focusing on computer graphics and economics. The only prerequisite is a basic knowledge of calculus and linear algebra.

Contents: Mathematical Introduction; From Haar Function Approximation to Multiresolution Analysis; MRA and Mother Wavelets; Wavelets in Computer Graphics; Wavelets in Economics and Econometrics; Advanced Wavelet Analysis and Additional Applications.

250pp Dec 2011
978-981-283-400-3 US\$77 £53
978-981-283-401-0(ebook) US\$100

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Series on Coding Theory and Cryptology

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300pp Jul 2011
978-981-4335-75-1 US\$99 £61
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300pp Jul 2011
978-981-4340-50-2 US\$59 £37

Peking University Series in Mathematics – Vol. 5

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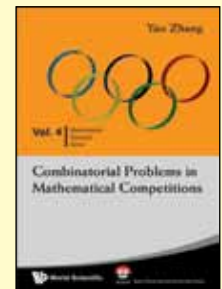
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by **Yao Zhang** (*Hunan Normal University, China*)

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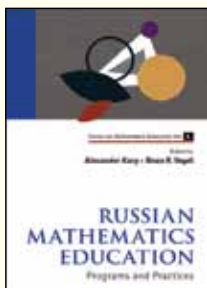
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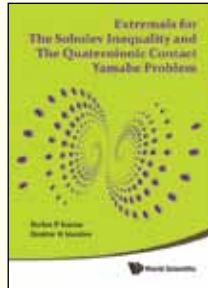
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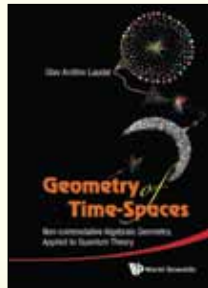
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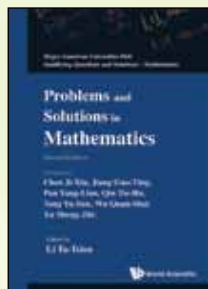
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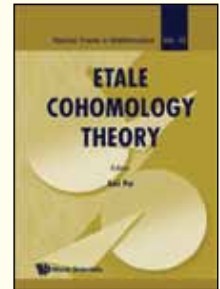
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by **Lei Fu** (*Chern Institute of Mathematics, Nankai University, China*)

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by **Alain Lecomte** (*Université de Paris VIII, France*)

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System, Wound Healing Process, and System Biology: The Immune System: A Phenomenological Overview; Wound Healing Process and Organ Repair; From Levels of Biological Organization to System Biology; **Mathematical Tools:** Mathematical Tools and Structures; Multiscale Modeling: Linking Molecular, Cellular, and Tissues Scales; **Applications and Research Perspectives:** A Model for the Malign Keloid Formation and Immune System Competition; Macroscopic Models of Chemotaxis by KTAP Asymptotic Methods; Looking Ahead.

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FRACTIONAL CALCULUS AND WAVES IN LINEAR VISCOELASTICITY

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This monograph provides a comprehensive overview of the author's work on the fields of fractional calculus and waves in linear viscoelastic media, which includes his pioneering contributions on the applications of special functions of the Mittag-Leffler and Wright types.

It is intended to serve as a general introduction to the above-mentioned areas of mathematical modeling. The explanations in the book are detailed enough to capture the interest of the curious reader, and complete enough to provide the necessary background material needed to delve further into the subject and explore the research literature given in the huge general bibliography.

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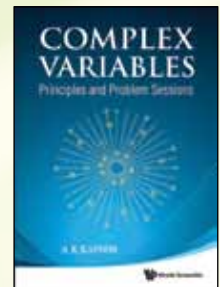
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388pp
978-981-4273-29-9 Feb 2011
US\$85 £56
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Boson Condensation, Ordered Patterns and Topological Defects

by **Massimo Blasone** (*Università di Salerno & INFN, Italy*), **Petr Jizba** (*Czech Technical University, Prague, Czech Republic*), & **Giuseppe Vitiello** (*Università di Salerno & INFN, Italy*)



“This remarkable book dispels the common misconception that quantum field theory is ‘just quantum mechanics with an infinite number of degrees of freedom’, revealing vast new mathematical terrains, and new ways of understanding physical phenomena in both commonplace and exotic systems.

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John Swain

Physics Department, Northeastern University, Boston, MA, USA

544pp
978-1-84816-280-8 Jan 2011
US\$150 £98
978-1-84816-281-5(ebook) US\$195

NEW TRENDS IN QUANTUM INTEGRABLE SYSTEMS

Proceedings of the Infinite Analysis 09

Kyoto, Japan, 27 – 31 July 2009

edited by **Boris Feigin** (*Landau Institute for Theoretical Physics, Russia*), **Michio Jimbo** (*Rikkyo University, Japan*), & **Masato Okado** (*Osaka University, Japan*)

The present volume is the result of the international workshop on *New Trends in Quantum Integrable Systems* that was held in Kyoto, Japan, from 27 to 31 July 2009. As a continuation of the RIMS Research Project “Method of Algebraic Analysis in Integrable Systems” in 2004, the workshop’s aim was to cover exciting new developments that have emerged during the recent years. Collected here are research articles based on the talks presented at the workshop, including the latest results obtained thereafter.

516pp
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US\$170 £105
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MATHEMATICAL FOUNDATION AND APPLICATIONS OF THE P AND H-P FINITE ELEMENT METHODS

by **Benqi Guo** (*University of Manitoba, Canada*)

This book provides comprehensive knowledge and up-to-date developments of the p and h-p finite element methods. Introducing systematically the Jacobi-weighted Sobolev and Besov spaces, it establishes the approximation theory in the framework of these spaces in n dimensions. This in turn leads to the optimal convergence of the p and h-p finite element methods with quasi-uniform meshes in two dimensions for problems with smooth solutions and singular solutions on polygonal domains.

The book is based on the author’s research on the p and h-p finite element methods over the past three decades. This includes the recently established approximation theory in Jacobi-weighted Sobolev and Besov spaces and rigorous proof of the optimal convergence of the p and h-p finite element method with quasi-uniform meshes for elliptic problems on polygonal domains.

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978-981-283-893-3 Jun 2011
US\$107 £74
978-981-283-894-0(ebook) US\$139

QUALITATIVE COMPUTING

A Computational Journey into Nonlinearity

by **Françoise Chatelin**

(*Université de Toulouse, France & CERFACS, France*)

The book illustrates how qualitative computing has been the driving force behind the evolution of mathematics since Pythagoras presented the first incompleteness result about the irrationality of $\sqrt{2}$. The celebrated results of Gödel and Turing are but modern versions of the same idea: the classical logic of Aristotle is too limited to capture the dynamics of nonlinear computation. Mathematics provides us with the missing tool, the organic logic, which is aptly tailored to model the dynamics of nonlinearity. This logic will be the core of the “Mathematics for Life” to be developed during this century.

600pp
978-981-4322-92-8 Feb 2011
US\$120 £74
978-981-4322-93-5(ebook) US\$156

COMPUTABILITY IN CONTEXT**Computation and Logic in the Real World**

edited by **S Barry Cooper** (*University of Leeds, UK*) &
Andrea Sorbi (*Universita degli Studi di Siena, Italy*)

Computability has played a crucial role in mathematics and computer science. This volume addresses various aspects of the ways computability and theoretical computer science enable scientists and philosophers to deal with mathematical and real-world issues, covering problems related to logic, mathematics, physical processes, real computation and learning theory. At the same time it will focus on different ways in which computability emerges from the real world, and how this affects our way of thinking about everyday computational issues.

400pp **Feb 2011**
978-1-84816-245-7 **US\$124 £86**
978-1-84816-277-8(ebook) **US\$161**

STRONG STABILITY PRESERVING RUNGE-KUTTA AND MULTISTEP TIME DISCRETIZATIONS

by **Sigal Gottlieb** (*University of Massachusetts Dartmouth, USA*),
David Ketcheson (*KAUST, Kingdom of Saudi Arabia*), &
Chi-Wang Shu (*Brown University, USA*)

This book captures the state-of-the-art in the field of Strong Stability Preserving (SSP) time stepping methods, which have significant advantages for the time evolution of partial differential equations describing a wide range of physical phenomena. This comprehensive book describes the development of SSP methods, explains the types of problems which require the use of these methods and demonstrates the efficiency of these methods using a variety of numerical examples.

188pp **Jan 2011**
978-981-4289-26-9 **US\$80 £52**
978-981-4289-27-6(ebook) **US\$104**

OPTIMIZATION AND CONTROL THEORY

Series on Applied Mathematics – Vol. 19

PARTITIONS**Optimality and Clustering****Vol I: Single-Parameter**

by **Frank K Hwang** (*National Chiao-Tung University, Taiwan*) &
Uriel G Rothblum (*Technion, Israel*)

The need of optimal partition arises from many real-world problems involving the distribution of limited resources to many users. The “clustering” problem, which has recently received a lot of attention, is a special case of optimal partitioning. This book is the first attempt to collect all theoretical developments of optimal partitions, many of them derived by the authors, in an accessible place for easy reference. Much more than simply collecting the results, the book provides a general framework to unify these results and present them in an organized fashion.

Many well-known practical problems of optimal partitions are dealt with. The authors show how they can be solved using the theory — or why they cannot be.

364pp **Mar 2011**
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**PROBABILITY & STATISTICS****NONLINEAR MIXTURE MODELS****A Bayesian Approach**

by **Tatiana Tatarinova** (*University of Glamorgan, UK*) &
Alan Schumitzky (*University of Southern California, USA*)

This book provides a broad introduction to the important subject of nonlinear mixture models from a Bayesian perspective. It contains background material, a brief description of Markov chain theory, as well as novel algorithms and their applications. It is self-contained and unified in presentation, which makes it ideal for use as an advanced textbook by graduate students and as a reference for independent researchers. The explanations in the book are detailed enough to capture the interest of the curious reader, and complete enough to provide the necessary background material needed to go further into the subject and explore the research literature.

250pp **Oct 2011**
978-1-84816-756-8 **US\$90 £59**
978-1-84816-757-5(ebook) **US\$117**

LARGE SAMPLE INFERENCE FOR LONG MEMORY PROCESSES

by **Liudas Giraitis** (*University of London, UK*), **Hira L Koul** (*Michigan State University, USA*), & **Donatas Surgailis** (*Institute of Mathematics and Informatics, Lithuania*)

The aim of this volume is to provide a text at the graduate level from which one can learn, in a concise fashion, some basic theory and techniques of proving limit theorems for numerous statistics based on long memory processes. It also provides a guide to researchers about some of the inference problems under long memory.

Contents: Introduction; Estimation; Some Inference Problems; Residual Empirical Processes; Regression Models; Nonparametric Regression with Heteroscedastic Errors; Model Checking under Long Memory; Long Memory under Infinite Variance.

500pp **Sep 2011**
978-1-84816-278-5 **US\$99 £68**

AN INTRODUCTION TO THE THEORY OF PROBABILITY

by **Parimal Mukhopadhyay** (*Indian Statistical Institute, India*)

This book provides a systematic exposition of the theory in a setting which contains a balanced mixture of the classical approach and the modern day axiomatic approach. It covers many unusual distributions, but with applications in Economics, Demography and other social sciences, including the power series distribution. The truncated forms of the distributions have also been included.

This book tries to explain the difficult ideas in the axiomatic approach to the theory of probability in a clear and comprehensible manner. It includes several unusual distributions including the power series distribution that has been covered in great detail. Readers will find many worked-out examples and exercises with hints, which will make the book easily readable and engaging.

Contents: Classical Theory and Its Limitations; Axiomatic Approach; Random Variables and Distributions; Expectation of a Discrete Random Variable; Properties of Probability Distributions in \mathbb{R}^1 ; Generating Functions; Some Discrete Distributions in \mathbb{R}^1 ; Some Continuous Distributions in \mathbb{R}^1 ; Probability Distributions in \mathbb{R}^n ; Probability Distribution of Functions of Random Variables; Convergence of a Sequence of Random Variables.

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978-981-4313-42-1 **US\$62 £38**

NEW & FORTHCOMING MATHEMATICS 2011

INTRODUCTION TO HIDA DISTRIBUTIONS

by **Si Si** (*Aichi Prefectural University, Japan*)

This book provides the mathematical definition of white noise and gives its significance. It analyzes those functionals of white noise, particularly the generalized ones called Hida distributions, and highlights some interesting future directions. The main part of the book involves infinite dimensional differential and integral calculus based on the variable which is white noise.

The present book can be used as a supplementary book to *Lectures of White Noise Functionals* published in 2008, with detailed background provided.

Contents: White Noise and Its Probability Distribution; Linear Functionals of White Noise; Gaussian Systems and Their Representations; Nonlinear Functionals of White Noise; Hida Distributions (Generalized Functionals of White Noise); Applications to Quantum Dynamics, Statistics and Biology.

200pp Jun 2011
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A First Course in Biostatistics

by **Raluca Balan & Gilles Lamothe**
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Statistical reasoning and modeling are of critical importance to modern biology. This textbook introduces fundamental concepts from probability and statistics which will pave the way for the student of biology to become a well-rounded scientist. This book puts emphasis on examples, which are presented to motivate the theory. The presentation style is concise and self-contained, briefly including the mathematical elements that are needed for studying probability and statistics. The examples are relevant to students in the life sciences with interests in genetics, biology, ecology, health, etc.

Contents: Probability: Probability; Combinatorial Techniques; Elementary Genetics; Conditional Probability; Bayes' Rule; Statistical Independence; Discrete and Continuous Random Variables; Binomial; Poisson; Normal Distributions; **Statistics:** Gathering and Describing Data; Sampling Distributions; Point and Interval Estimation; Hypothesis Testing; Comparison of Two Independent Samples; Paired Samples; Categorical Data, Regression and Correlation.

200pp Jun 2011
978-981-4291-32-3 US\$54 £37

TOPICS IN PROBABILITY

by **Narahari Prabhu** (*Cornell University, USA*)

Recent research in probability has been concerned with applications such as data mining and finance models. Some aspects of the foundations of probability theory have receded into the background. Yet, these aspects are very important and have to be brought back into prominence.

Contents: Probability Distributions; Characteristic Functions; Analytic Characteristic Functions; Infinitely Divisible Distributions; Self-Decomposable Distributions; Triangular Arrays.

200pp May 2011
978-981-4335-47-8 US\$78 £48

ARTHUR L BOWLEY

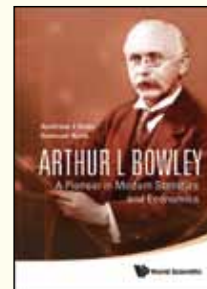
A Pioneer in Modern Statistics and Economics

by **Samuel Kotz** (*George Washington University, USA*) & **Andrew I Dale** (*University of KwaZulu-Natal, South Africa*)

Arthur Lyon Bowley, the founding father of modern statistics, was an important and colorful figure and a leader in cementing the foundations of statistical methodology, including survey methodology, and of the applications of statistics to economical and social issues during the late 19th and early 20th centuries. In many respects, he was ahead of his time.

The giants in this field around that time were largely concentrated in the British Isles and Scandinavian countries; among these contributors, Arthur Bowley was one of the most active in revolutionizing statistical methodology and its economic applications. However, Bowley has been vastly undervalued by subsequent commentators — while hundreds of articles and books have been written on Karl Pearson, those on Arthur Bowley amount to a dozen or less. This book seeks to remedy this and fill in an important omission in the monographical literature on the history of statistics. In particular, the recent resurgence of interest in poverty research has led to a renewed interest in Bowley's legacy.

532pp Apr 2011
978-981-283-550-5 US\$110 £72
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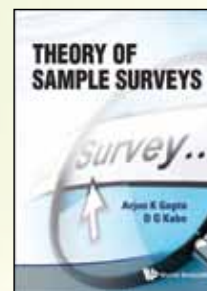
THEORY OF SAMPLE SURVEYS

by **Arjun K Gupta** (*Bowling Green State University, USA*) & **D G Kabe** (*St Mary's University, Canada*)

This book is the culmination of the lecture notes developed by the authors. The approach is theoretical in the sense that it gives mathematical proofs of the results in sample surveys. Intended as a textbook for a one-semester course for undergraduate seniors or first-year graduate students, a prerequisite basic knowledge of algebra, calculus, and statistical theory is required to master the techniques described in this book.

Contents: Simple Random Sampling; Sampling with Varying Probabilities of Selection; Stratified Sampling; Systematic Sampling; Ratio Method of Estimation; Regression Method of Estimation; Cluster Sampling; Sub-Sampling Two-Stage and Three-Stage Sampling; Double Sampling; Non-Sampling Errors.

236pp Feb 2011
978-981-4322-47-8 US\$58 £36



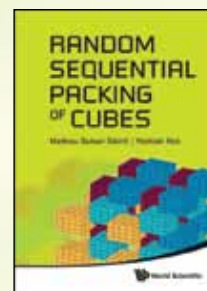
RANDOM SEQUENTIAL PACKING OF CUBES

by **Mathieu Dutour Sikirić** (*Ruđer Bošković Institute, Croatia*) & **Yoshiaki Itoh** (*The Graduate University for Advanced Studies, Japan & The Institute of Statistical Mathematics, Japan*)

In this volume very simplified models are introduced to understand the random sequential packing models mathematically.

Contents: The Flory Model; Random Interval Packing; On the Minimum of Gaps Generated by 1-Dimensional Random Packing; Integral Equation Method for the 1-Dimensional Random Packing; Random Sequential Bisection and Its Associated Binary Tree; The Unified Kakutani Rényi Model; Parking Cars with Spin But No Length; Random Sequential Packing Simulations; Discrete Cube Packings in the Cube; Discrete Cube Packings in the Torus; Continuous Random Cube Packings in Cube and Torus; Appendix: Combinatorial Enumeration.

256pp Jan 2011
978-981-4307-83-3 US\$80 £50
978-981-4307-84-0(ebook) US\$104



Frontiers of Statistics – Vol. 2

HIGH-DIMENSIONAL DATA ANALYSISedited by **Tony Cai** (*University of Pennsylvania, USA*) & **Xiaotong Shen** (*University of Minnesota, USA*)

This book intends to examine important issues arising from high-dimensional data analysis to explore key ideas for statistical inference and prediction. It is structured around topics on multiple hypothesis testing, feature selection, regression, classification, dimension reduction, as well as applications in survival analysis and biomedical research.

The book will appeal to graduate students and new researchers interested in the plethora of opportunities available in high-dimensional data analysis.

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978-981-4324-85-4 **US\$85 £53**
978-981-4324-86-1(ebook) **US\$111**

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CHANGE OF TIME AND CHANGE OF MEASUREby **Ole E Barndorff-Nielsen** (*Aarhus University, Denmark*) & **Albert Shiryaev** (*Steklov Mathematical Institute, Russia & Moscow State University, Russia*)

This book provides a comprehensive account of two topics that are of particular significance in both theoretical and applied stochastics: random change of time and change of probability law. The book comprehensively collects and integrates results from a number of scattered sources in the literature and discusses the importance of the results relative to the existing literature, particularly with regard to mathematical finance. It is invaluable as a textbook for graduate-level courses and students or a handy reference for researchers and practitioners in financial mathematics and econometrics.

324pp **Nov 2010**
978-981-4324-47-2 **US\$70 £43**

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RUIN PROBABILITIES**Second Edition**by **Søren Asmussen** (*Aarhus University, Denmark*) & **Hansjörg Albrecher** (*University of Lausanne, Switzerland*)**Reviews of the First Edition**

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Zentralblatt Maths

The book gives a comprehensive treatment of the classical and modern ruin probability theory.

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978-981-4282-52-9 **US\$111 £76**
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INCOMPLETE BLOCK DESIGNSby **Aloke Dey** (*Indian Statistical Institute, New Delhi, India*)

This book presents a systematic, rigorous and comprehensive account of the theory and applications of incomplete block designs. All major aspects of incomplete block designs are considered by consolidating vast amounts of material from the literature including the classical incomplete block designs, like the balanced incomplete block (BIB) and partially balanced incomplete block (PBIB) designs.

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978-981-4322-69-0(ebook) **US\$96**

STOCHASTIC ANALYSIS**ELEMENTS OF STOCHASTIC FINANCE****Theory, Methods, and Computation**by **Frederi G Viens**, **José Enrique Figueroa-López** (*Purdue University, USA*), & **Alexandra Chronopoulou** (*Institut National de Recherche en Informatique et Automatique, France*)

This comprehensive course on financial mathematics is aimed at beginning graduate students in any field with a good quantitative background, and is appropriate for advanced undergraduates in mathematics and statistics. It is also invaluable as a reference for practitioners in financial engineering.

A large number of exercises illustrate the theory and practice of each financial topic, some of which encourage the reader to engage in high-level programming. This is facilitated by an extensive online companion to the text, in the form of a primer on programming, tailored to the text's exercises, covering languages popular in the financial industry, including C++, C#, Matlab, and Excel/VBA.

400pp **Nov 2011**
978-981-4307-36-9 **US\$78 £51**
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CONTINUOUS-TIME MARKOV CHAINS**Q-Matrix Problem**by **Hou Zhenfeng**, **Li Junping** (*Central South University, China*), & **Chen Anyue** (*University of Liverpool, UK & University of Hong Kong, Hong Kong*)

This book reports the recent progress in the field of continuous-time Markov chains (CTMCs), with a comprehensive and extensive discussion on its general theory and applications.

Contents: Transition Functions and Q-Matrix; Some Basic Tools; Existence of Q-Processes: Stable Q-Matrix Case; Uniqueness of Q-Processes: Stable Q-Matrix Case; Existence and Uniqueness: Unstable Q-Matrix Case; Irreducibility and Recurrence; Ergodicity and Equilibrium Distribution; Absorbing Chains and Branching Processes; Invariant Measure and Quasi-Limiting Distributions; Reversibility and Birth-Death Processes; Monotonicity and Duality; Coupling and Spectral Gap; Markovian Queues and Skip-Free Processes.

400pp **Jun 2011**
978-981-283-806-3 **US\$77 £53**

Series on Concrete and Applicable Mathematics – Vol. 12

MARKOV PROCESSES, FELLER SEMIGROUPS AND EVOLUTION EQUATIONSby **Jan A van Casteren** (*University of Antwerp, Belgium*)

The book provides a systemic treatment of time-dependent strong Markov processes with values in a Polish space. It describes its generators and the link with stochastic differential equations in infinite dimensions. In a unifying way, where the square gradient operator is employed, new results for backward stochastic differential equations and long-time behavior are discussed in depth. The book also establishes a link between propagators or evolution families with the Feller property and time-inhomogeneous Markov processes. This mathematical material finds its applications in several branches of the scientific world, among which are mathematical physics, hedging models in financial mathematics, and population models.

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Reviews of the First Edition

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Bell Laboratories, New Jersey, USA, in EOS (American Geophysical Union)

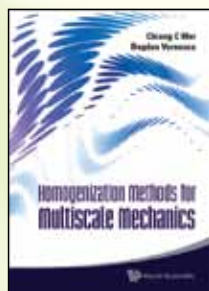
Contents: Introduction; Fundamentals of Analysis of Random Fields; Second-Order Analysis of Homogeneous Random Fields; Spectral Parameters, Level Crossings, and Extremes; Local Average Processes on the Line; Two-Dimensional Local Average Processes; Multi-Dimensional Local Average Processes; Overview of Findings.

364pp Jul 2010
978-981-256-297-5 US\$85 £53
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HOMOGENIZATION METHODS FOR MULTISCALE MECHANICS

by Chiang C Mei (Massachusetts Institute of Technology, USA) & Bogdan Vernescu (Worcester Polytechnic Institute, USA)

The authors share the view that the general methods of homogenization should be more widely understood and practiced by applied scientists and engineers. Hence this book is aimed at providing a less abstract treatment of the theory of homogenization for treating inhomogeneous media, and at illustrating its broad range of applications.



Contents: Introductory Examples of Homogenization Method; Diffusion in a Composite; Seepage in Rigid Porous Media; Dispersion in Periodic Media or Flows; Heterogeneous Elastic Materials; Deformable Porous Media; Wave Propagation in Inhomogeneous Media.

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GROUP THEORY AND HOPF ALGEBRAS

Lectures for Physicists

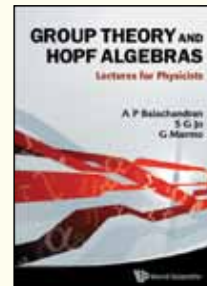
by A P Balachandran (Syracuse University, USA), S G Jo (Kyungpook National University, Korea), & G Marmo (University Federico II Naples, Italy)

This book is addressed to graduate students and research workers in theoretical physics who want a thorough introduction to group theory and Hopf algebras. It is suitable for a one-semester course in group theory or a two-semester course which also treats advanced topics.

A unique aspect of the book is its treatment of Hopf algebras in a form accessible to physicists. There are illustrative examples from physics scattered throughout the book and in its set of problems. It also has a good bibliography. These features should enhance its value to readers.

Contents: General Notions; Finite Groups; Lie Groups; The Poincaré Group; Hopf Algebras in Physics.

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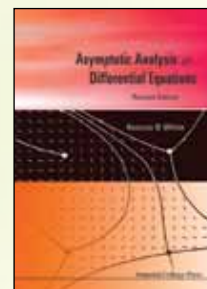
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