Mathematical Physics 2011

:: Notable Title

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

FIFTY YEARS OF MATHEMATICAL PHYSICS

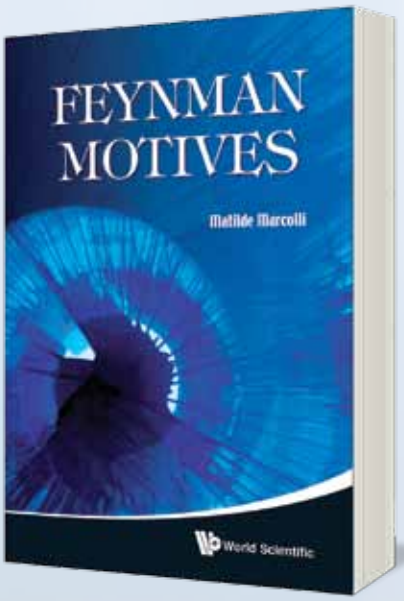
Selected Works of Ludvig Faddeev

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

This unique volume summarizes with a historical perspective several of the major scientific achievements of Ludvig Faddeev, with a foreword by Nobel Laureate C N Yang. The volume that spans over fifty years of Faddeev's career begins where he started his own scientific research, in the subject of scattering theory and the three body problem. It then continues to describe Faddeev's contributions to automorphic functions, followed by an extensive account of his many fundamental contributions to field theory including his original article on ghosts with Popov. Faddeev's contributions to soliton theory and integrable models are then described, followed by a survey of his work on quantum groups. The final scientific section is devoted to Faddeev's contemporary research including articles on his long-term interest in constructing knotted solitons and understanding confinement. The volume concludes with his personal view on science and mathematical physics in particular.

500pp	**Aug 2011**	
978-981-4340-95-3	**US$138**	**£90**
978-981-4340-96-0(ebook)	**US$179**	

:: Top-Selling Textbook



FEYNMAN MOTIVES

by **Matilde Marcolli**

(California Institute of Technology, USA)

"This book can serve as an excellent guide for graduate students and researchers to this new area, in particular to the reasons of enigmatic reappearance of Euler's multiple zeta values as basic Feynman periods."

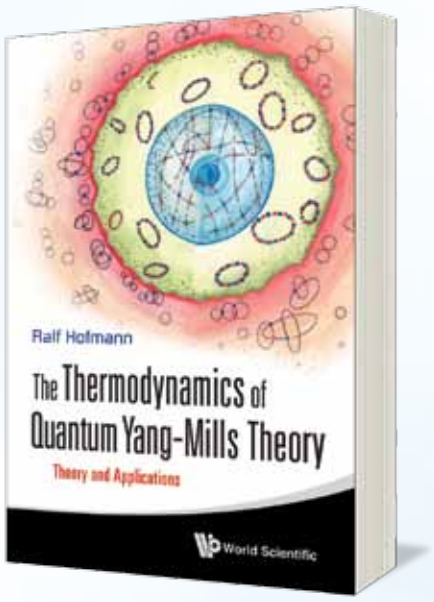
Yu I Manin
Max-Planck-Institute for Mathematics, Bonn
Chair of the Fields Medal Committee, 1998

This book presents recent and ongoing research work aimed at understanding the mysterious relation between the computations of Feynman integrals in perturbative quantum field theory and the theory of motives of algebraic varieties and their periods. The text is aimed at researchers in mathematical physics, high energy physics, number theory and algebraic geometry.

Contents: Perturbative Quantum Field Theory and Feynman Diagrams; Motives and Periods; Feynman Integrals and Algebraic Varieties; Feynman Integrals and Gelfand–Leray Forms; Connes–Kreimer Theory in a Nutshell; The Riemann–Hilbert Correspondence; The Geometry of DimReg; Renormalization, Singularities, and Hodge Structures; Beyond Scalar Theories.

236pp	**Dec 2009**	
978-981-4271-20-2	**US$48**	**£36**
978-981-4304-48-1(pbk)	**US$24**	**£18**

:: Highly Recommended



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.

Contents: Theory of Topologically Nontrivial Field Configurations; Thermal Ground State as Emergent Phenomena; Non-Perturbative Loop Expansion; Dynamically Cascading Gauge-Symmetry Breakings; Anomalies at Large Angles in the Cosmic Microwave Background; Dark Energy and a Planck-Scale Error; Fermions as Center-Vortex Loops; Cosmological Constant.

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

Series on Knots and Everything

INTRODUCTORY LECTURES ON KNOT THEORY

Selected Lectures Presented at the Advanced School and Conference on Knot Theory and Its Applications to Physics and Biology
ICTP, Trieste, Italy, 11 – 29 May 2009

edited by **Louis H Kauffman** *(University of Illinois at Chicago, USA)*, **Sofia Lambropoulou** *(National Technical University of Athens, Greece)*, **Slavik Jablan** *(Serbian Academy of Sciences and Arts, Serbia)*, & **Jozef H Przytycki** *(George Washington University, USA)*

Knot theory is a very special topological subject: the classification of embeddings of a circle or collection of circles into three-dimensional space. It has significant applications and relations with biology, physics, combinatorics, algebra and the theory of computation. The summer school on which this book is based contained excellent lectures on the many aspects of applications of knot theory. This book gives an in-depth survey of the state of the art of present day knot theory and its applications.

550pp	**Nov 2011**	
978-981-4307-99-4	**US$156**	**£107**
978-981-4313-00-1(ebook)	**US$203**	

Advanced Series in Mathematical Physics

OPERADS, STRINGS AND DELIGNE'S CONJECTURE

A Text for Mathematicians and Physicists

by **Ralph M Kaufmann** *(University of Connecticut, USA)*

The focus of this book, which is the first of its kind, is the particularly striking relation between algebra, topology and string theory that is mediated by operads of graphs and surfaces in their role as a model of the correlation functions of quantum field theory. It provides comprehensive introduction for anyone interested in modern mathematical physics with ramifications for algebra and geometry.

Contents: Operads; Surfaces; Correlation functions; The Hochschild Complex; Deligne's Conjecture and Its Generalizations; Further Applications.

300pp	**Nov 2011**	
978-981-277-596-2	**US$73**	**£51**

ICP Advanced Texts in Mathematics

GEOMETRIC REALIZATIONS OF CURVATURE

by **Peter B Gilkey** *(University of Oregon, USA)*, **Miguel Brozos Vázquez** *(Universidade da Coruña, Spain)*, & **Stana Nikcevic** *(University of Belgrade, Serbia)*

The book organizes, in one coherent volume, the results of research completed by many different investigators over the past 30 years. Complete proofs are given of results that are often only outlined in the original publications. Whereas the original results are usually in the positive definite (Riemannian setting), here the authors extend the results to the pseudo-Riemannian setting and then further, in a complex framework, to para-Hermitian geometry as well. In addition to that, new results are obtained as well, making this an ideal text for anyone wishing to further their knowledge of the science of curvature.

264pp	**Nov 2011**	
978-1-84816-741-4	**US$86**	**£56**
978-1-84816-742-1(ebook)	**US$112**	

GEOMETRIC MECHANICS (Second Edition)

by **Darryl D Holm** *(Imperial College London, UK)*

This textbook introduces the tools and language of modern geometric mechanics to advanced undergraduates and beginning graduate students in mathematics, physics, and engineering.

Part I: Dynamics and Symmetry

The ideas and concepts of geometric mechanics are explained in the context of explicit examples. Through these examples, the student develops skills in performing computational manipulations, starting from Fermat's principle, working through the theory of differential forms on manifolds and transferring these ideas to the applications of reduction by symmetry to reveal Lie–Poisson Hamiltonian formulations and momentum maps in physical applications.

Contents: Fermat's Principle for Ray Optics; Reviews of the Contributions of Newton Lagrange, Euler, Hamilton, Lie, Poincaré and Cartan in the Foundations of Geometric Mechanics; Rotations of a Rigid Body; Differential Forms; Lie Derivatives; Resonances and Symmetry Reduction; Geometric and Dynamic Phases; Elastic Spherical Pendulum; Maxwell–Bloch Equations For Laser–Matter Interaction.

400pp	**Jul 2011**	
978-1-84816-774-2	**US$98**	**£64**
978-1-84816-775-9(pbk)	**US$48**	**£31**

Part II: Rotating, Translating and Rolling

This part treats the dynamics of rotating, spinning and rolling rigid bodies from a geometric viewpoint, by formulating their solutions as coadjoint motions generated by Lie groups.

Contents: Galilean Relativity; Reviews of the Contributions of Newton Lagrange, Euler, Hamilton, Lie, Noether and Poincaré in the Foundations of Geometric Mechanics; Rotations, Using Quaternions and Their Adjoint and Coadjoint Operations; Special Orthogonal and Special Euclidean Groups; Heavy Tops; Euler–Poincaré Equations; Lie–Poisson Hamiltonian Form; Momentum Maps; Round Rolling Bodies.

400pp	**Nov 2011**	
978-1-84816-777-3	**US$98**	**£64**
978-1-84816-778-0(pbk)	**US$48**	**£31**

FRACTIONAL DYNAMICS

Recent Advances

edited by **Joseph Klafter** *(Tel Aviv University, Israel)*, **S C Lim**, & **Ralf Metzler** *(Technische Universität Munchen, Germany)*

This volume provides the latest developments in the field of fractional dynamics, which covers fractional (anomalous) transport phenomena, fractional statistical mechanics, fractional quantum mechanics and fractional quantum field theory. The contributors are selected based on their active and important contributions to their respective topics. This volume is the first of its kind that covers such a comprehensive range of topics in fractional dynamics. It will point out to advanced undergraduate and graduate students, and young researchers the possible directions of research in this subject.

400pp	**Sep 2011**	
978-981-4340-58-8	**US$120**	**£74**
978-981-4340-59-5(ebook)	**US$156**	

HAMILTON–JACOBI THEORY VIA CARTAN GEOMETRY

by **Raymond G McLenaghan** *(University of Waterloo, Canada)* & **Roman G Smirnov** *(Dalhousie University, Canada)*

The central theme of the book is the fusion of two classical theories that were extensively developed in the course of the twentieth century, namely the Hamilton–Jacobi theory of separation of variables and Cartan geometry. This self-contained textbook is suitable for a one-year graduate course in applicable differential geometry. It is well illustrated with numerous examples, applications and exercises. It will also be useful to experts in various areas of mathematical physics who are interested in applications of Cartan geometry.

220pp	**Jul 2011**	
978-981-256-058-2	**US$89**	**£61**

Series on Number Theory & Its Applications – Vol. 3

MULTI-DIMENSIONAL LANGLANDS FUNCTORIALITY PRINCIPLE

Notes on M M Kapranov's Work

by **Kâzım İlhan İkeda** *(Yeditepe University, Istanbul, Turkey)*

This book 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.

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

NAVIER-STOKES EQUATIONS IN PLANAR DOMAINS

by **Matania Ben-Artzi** *(Hebrew University of Jerusalem, Israel)*, **Jean-Pierre Croisille** *(Universite 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". A comprehensive treatment of the mathematical theory developed in the last 15 years is elaborated, heretofore never presented in other books.

260pp **May 2011**
978-1-84816-275-4 **US$79 £54**
978-1-84816-276-1(ebook) **US$103**

THE SEGAL-BARGMANN TRANSFORM ON EUCLIDEAN SPACE AND GENERALIZATIONS

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.

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**
978-981-4277-50-1 **US$65 £45**

Series on Partial Differential Equations and Applications

SOLUTION SET OF SEMILINEAR ELLIPTIC EQUATIONS

Global Bifurcation and Exact Multiplicity

by **Junping Shi** *(College of William & Mary, USA)*

This volume provides a unified approach to the problem of exact multiplicity and global bifurcation of semilinear elliptic equations, demonstrating applications of modern bifurcation theory to important nonlinear equations in physics, chemistry and biology. In particular, it lucidly presents a systematic theory of precise bifurcation diagrams for the development of radially symmetric solutions over the last thirty years. The volume is an essential reference for researchers in the fields of nonlinear elliptic and parabolic equations, as well as many applied fields in physics, chemistry and biology.

250pp **Jul 2011**
978-981-277-594-8 **US$65 £45**
978-981-277-595-5(ebook) **US$85**

MATHEMATICAL MODELING OF NON-NEWTONIAN FLUIDS WITH APPLICATIONS

by **Giovanni Galdi** & **Anne Robertson**
(University of Pittsburgh, USA)

The objective of this book is several-fold. Firstly, it collects and describes the most significant experiments that do not find explanation in the classical Newtonian (Navier–Stokes) theory. Then, it introduces some of the most commonly used models of non-Newtonian fluid. Finally, it presents a rigorous mathematical explanation of the relevant experiments.

Contents: Why Non-Newtonian Models?; Fluid–Particle Interaction: Some Puzzling Experiments; The Reiner–Rivlin Model; The Power Law Model; Simple Fluids; Small Weissenberg Numbers: The Second-Order Model; The Oldroyd-B and Related Models; Non-Newtonian Fluid and Turbulence Modeling.

400pp **Jun 2011**
978-981-283-803-2 **US$98 £61**

NEW TRENDS IN GEOMETRY

Their Role in the Natural and Life Sciences

edited by **Claudio Bartocci** *(Università di Genova, Italy)*, **Luciano Boi** *(École des Hautes Études en Sciences Sociales, France)*, & **Corrado Sinigaglia** *(Università degli Studi di Milan, Italy)*

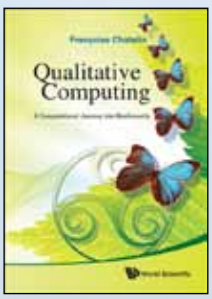
This volume focuses on the interactions between mathematics, physics, biology and neuroscience by exploring new geometrical and topological modelling in these fields. Among the highlights are the central roles played by multilevel and scale-change approaches in these disciplines. The integration of mathematics with physics, as well as molecular and cell biology and the neurosciences, will constitute the new frontier of 21st century science, where breakthroughs are more likely to span across traditional disciplines.

312pp **Apr 2011**
978-1-84816-642-4 **US$98 £64**
978-1-84816-643-1(ebook) **US$127**

QUALITATIVE COMPUTING

A Computational Journey into Nonlinearity

by **Françoise Chatelin**
(Université de Toulouse, France & CERFACS, France)

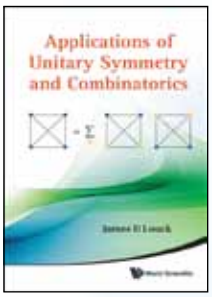


High technology industries are in desperate need for adequate tools to assess the validity of simulations produced by ever faster computers for perennial unstable problems. This book is unique as it proposes truly original solutions: (1) Using hypercomputation in quadratic algebras, as opposed to the traditional use of linear vector spaces in the 20th century; (2) complementing the classical linear logic by the complex logic which expresses the creative potential of the complex plane. 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 $\sqrt{2}$.

600pp **Feb 2011**
978-981-4322-92-8 **US$120 £74**

APPLICATIONS OF UNITARY SYMMETRY AND COMBINATORICS

by **James D Louck** *(Los Alamos National Laboratory Fellow, New Mexico, Santa Fe, USA)*



This monograph is a synthesis of the theory of the pairwise coupling of the angular momenta of arbitrarily many independent systems to the total angular momentum in which the universal role of doubly stochastic matrices and their quantum-mechanical probabilistic interpretation is a major theme. A uniform viewpoint is presented based on the structure of binary trees. This includes a systematic method for the evaluation of all 3*n*–*j* coefficients and their relationship to cubic graphs. A number of topical subjects that emerge naturally are also developed, such as the algebra of permutation matrices, the properties of magic squares and an associated generalized Regge form, the Zeilberger counting formula for alternating sign matrices, and the Heisenberg ring problem, viewed as a composite system in which the total angular momentum is conserved.

350pp	**May 2011**	
978-981-4350-71-6	**US$90**	**£59**
978-981-4350-72-3(ebook)	**US$117**	

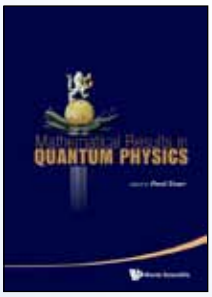
MATHEMATICAL RESULTS IN QUANTUM PHYSICS

(With DVD-ROM)

Proceedings of the QMath11 Conference

Hradec Králové, Czech Republic, 6 – 10 September 2010

edited by **Pavel Exner** *(Doppler Institute, Czech Republic)*



The volume collects papers from talks given at *QMath11 — Mathematical Results in Quantum Physics*, which was held in Hradec Králové, September 2010. These papers bring new and interesting results in quantum mechanics and information, quantum field theory, random systems, quantum chaos, as well as in the physics of social systems. Part of the contribution is dedicated to Ari Laptev on the occasion of his 60th birthday, in recognition of his mathematical results and his service to the community. The QMath conference series has played an important role in mathematical physics for more than two decades, typically attracting many of the best results achieved in the last three-year period, and the meeting in Hradec Králové was no exception.

300pp	**Jul 2011**	
978-981-4350-35-8	**US$105**	**£68**
978-981-4350-36-5(ebook)	**US$137**	

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. Emphasis is placed on the Kronecker product and tensor product. A key feature of the book is the many detailed worked-out examples.

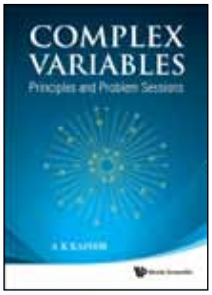
Contents: Matrix Calculus; Kronecker Product; Applications; Tensor Product; Braid-like Relations; Clebsch–Gordan Expansion; Nearest Kronecker Product; Clifford and Pauli Group; Universal Enveloping Algebra; Computer Algebra Implementation.

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

COMPLEX VARIABLES

Principles and Problem Sessions

by **A K Kapoor** *(University of Hyderabad, India)*



This textbook introduces the theory of complex variables at undergraduate level. The book is written in a user-friendly style that presents important fundamentals a beginner needs to master the technical details of the subject.

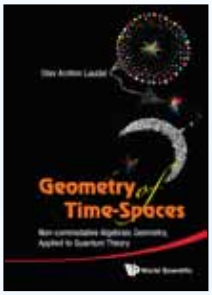
Contents: Complex Numbers; Elementary Functions and Differentiation; Functions with Branch Point Singularity; Integration in Complex Plane; Cauchy Integral Formula; Residue Theorem; Contour Integration; Asymptotic Expansion; Conformal Mappings; Physical Applications of Conformal Mappings.

500pp	**Mar 2011**	
978-981-4313-52-0	**US$98**	**£61**
978-981-4313-53-7(pbk)	**US$58**	**£36**

GEOMETRY OF TIME-SPACES

Non-commutative Algebraic Geometry, Applied to Quantum Theory

by **Olav Arnfinn Laudal** *(University of Oslo, Norway)*



This is a monograph about non-commutative algebraic geometry, and its application to physics. The main mathematical inputs are the non-commutative deformation theory, moduli theory of representations of associative algebras, a new non-commutative theory of phase spaces, and its canonical Dirac derivation. The book starts with a new definition of time, relative to which the set of mathematical velocities form a compact set, implying special and general relativity. With this model in mind, a general Quantum Theory is developed and shown to fit with the classical theory. In particular the "toy"-model used as example, contains, as part of the structure, the classical gauge groups u(1), su(2) and su(3), and therefore also the theory of spin and quarks, etc.

160pp	**Mar 2011**	
978-981-4343-34-3	**US$68**	**£44**
978-981-4343-35-0(ebook)	**US$88**	

APPLIED ANALYSIS

Mathematical Methods in Natural Science

Second Edition

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

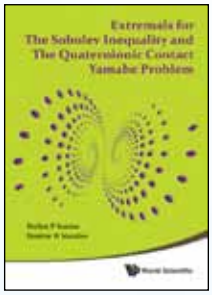
Mathematical Reviews

Contents: Field Formation; Geometric Objects; Calculus of Variations; Infinite-Dimensional Analysis; Scattering; Random Motion of Particles; Linear PDE; Nonlinear PDE.

532pp	**Mar 2011**	
978-1-84816-652-3	**US$110**	**£72**

EXTREMALS FOR THE SOBOLEV INEQUALITY AND THE QUATERNIONIC CONTACT YAMABE PROBLEM

by **Stefan P Ivanov** *(University of Sofia "St Kliment Ohridski", Bulgaria)* & **Dimiter N Vassilev** *(The University of New Mexico, USA)*



The aim of this book is to give an account of some important new developments in the study of the Yamabe problem on quaternionic contact manifolds.

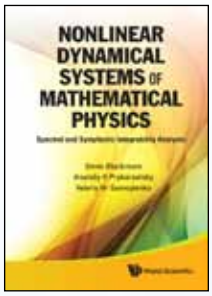
Contents: ***Analysis:*** Variational Problems Related to Sobolev Inequalities on Carnot Groups; Groups of Heisenberg and Iwasawa Types Explicit Solutions to the Yamabe Equation; Symmetries Solutions on Groups of Iwasawa Type; ***Geometry:*** Quaternionic Contact Manifolds — Connection, Curvature and qc-Einstein Structures; Quaternionic Contact Conformal Curvature Tensor; The Quaternionic Contact Yamabe Pronlem and the Yamabe Constant of the qc Spheres; CR Manifolds — Cartan and Chern-Moser Tensor and Theorem.

240pp **Mar 2011**
978-981-4295-70-3 **US$89 £58**

NONLINEAR DYNAMICAL SYSTEMS OF MATHEMATICAL PHYSICS

Spectral and Symplectic Integrability Analysis

by **Denis Blackmore** *(New Jersey Institute of Technology, USA)*, **Anatoliy K Prykarpatsky** *(AGH University of Science and Technology, Poland & The Ivan Franko State Pedagogical University, Ukraine)*, & **Valeriy Hr Samoylenko** *(Kyiv National Taras Shevchenko University, Ukraine)*



This distinctive volume presents a clear, rigorous grounding in modern nonlinear integrable dynamics theory and applications in mathematical physics, and an introduction to timely leading-edge developments in the field — including some innovations by the authors themselves — that have not appeared in any other book. This book is ideal as a reference and guide to new directions in research for advanced students and researchers interested in the modern theory and applications of integrable (especially infinite-dimensional) dynamical systems.

564pp **Mar 2011**
978-981-4327-15-2 **US$145 £94**
978-981-4327-16-9(ebook) **US$189**

INTRODUCTION TO CLASSICAL AND MODERN ANALYSIS AND THEIR APPLICATION TO GROUP REPRESENTATION THEORY

by **Debabrata Basu** *(Indian Institute of Technology, India)*

This book is suitable for use in any graduate course on analytical methods and their application to representation theory. Each concept is developed with special emphasis on lucidity and clarity.

Contents: ***Analysis:*** Basic Analytical Tools; Complex Integration; The Gamma, Beta and Zeta Function of Riemann; The Special Functions Defined by Power Series; Bargman–Segal Spaces of Analytic Functions; Elements of the Theory of Generalized Functions; ***Applications to Group Representation Theory:*** Lie Groups and Their Representations; The Three-Dimensional Rotation Group and SU(2) and Elements of SU(3); The Three-Dimensional Lorentz Group; The Four-Dimensional Lorentz Group; The Heisenberg–Weyl Group and the Bargmann–Segal Spaces.

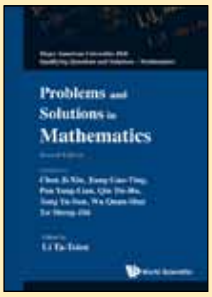
388pp **Feb 2011**
978-981-4273-29-9 **US$85 £56**
978-981-4273-30-5(pbk) **US$58 £38**

Major American Universities Ph.D. Qualifying Questions and Solutions - Mathematics

PROBLEMS AND SOLUTIONS IN MATHEMATICS

Second Edition

edited by **Ta-Tsien Li** *(Fudan University, China)*



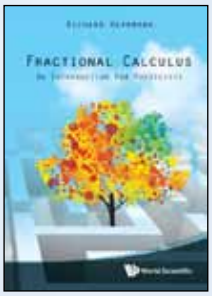
This book contains a selection of more than 500 mathematical problems and their solutions from the PhD qualifying examination papers of more than ten famous American universities. The mathematical problems cover six aspects of graduate school mathematics: Algebra, Topology, Differential Geometry, Real Analysis, Complex Analysis and Partial Differential Equations. While the depth of knowledge involved is not beyond the contents of the textbooks for graduate students, discovering the solution of the problems requires a deep understanding of the mathematical principles plus skilled techniques.

804pp **Feb 2011**
978-981-4304-95-5 **US$158 £103**
978-981-4304-96-2(pbk) **US$82 £53**

FRACTIONAL CALCULUS

An Introduction for Physicists

by **Richard Herrmann** *(GigaHedron, Germany)*



Fractional calculus is undergoing rapid and ongoing development. This book is an invitation both to the interested student and the professional researcher. It presents a thorough introduction to the basics of fractional calculus and guides the reader directly to the current state-of-the-art physical interpretation. It is also devoted to the application of fractional calculus on physical problems, in the subjects of classical mechanics, friction, damping, oscillations, group theory, quantum mechanics, nuclear physics, and hadron spectroscopy up to quantum field theory.

276pp **Feb 2011**
978-981-4340-24-3 **US$85 £53**
978-981-4340-25-0(ebook) **US$111**

QUANTUM FIELD THEORY AND ITS MACROSCOPIC MANIFESTATIONS

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 **Feb 2011**
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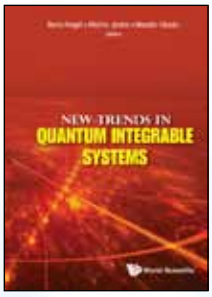
NEW TRENDS IN QUANTUM INTEGRABLE SYSTEMS

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.

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MARKOV PROCESSES, FELLER SEMIGROUPS AND EVOLUTION EQUATIONS

by **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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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.

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MURRAY GELL-MANN

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CERN Courier

This volume collects major publications of Murray Gell-Mann, providing physicists with easy access to much of Gell-Mann's work. Some of the articles are concerned with his recollections of the history of elementary particle physics in the third quarter of the twentieth century.

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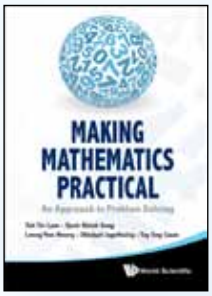

This book is the first of its kind, as it includes both mathematics content and pedagogy. It is a professional instructional manual on how mathematical problem solving curriculum can be implemented in the classrooms. The book develops from the theoretical work of Polya and Schoenfeld, and explicates how these can be translated to the actual implementation in schools. It represents the work of a group of researchers from the Singapore National Institute of Education, after experimenting with it in the Singapore school classrooms.

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ACADEMIC GENEALOGY OF MATHEMATICIANS

by **Sooyoung Chang**
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As modern mathematics has been developed by mathematicians over the past several hundred years, it is interesting to trace the academic genealogy of mathematicians — especially since all mathematicians learnt mathematics from their teachers. In this book, 750 mathematicians are listed along with the detailed descriptions of 464 famous mathematicians of the 19th and 20th centuries. In addition, interesting life stories and mathematical achievements are included with photographs.

Contents: German School; French School; Russian School; British School; Polish School; Hungarian School; Finish School; Swedish School; Norwegian School; Italian School; Dutch School; Belgian School; Austrian School; Japanese School; Korean School; American School; Australian School; Czech School.

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Choice

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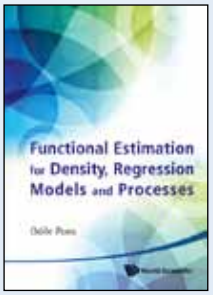

This book presents a unified approach on nonparametric estimators for models of independent observations, jump processes and continuous processes. New estimators are defined and their limiting behavior is studied. From a practical point of view, the book expounds on the construction of estimators for functionals of processes and densities, and provides asymptotic expansions and optimality properties from smooth estimators. It also presents new regular estimators for functionals of processes, compares histogram and kernel estimators, compares several new estimators for single-index models, and it examines the weak convergence of the estimators.

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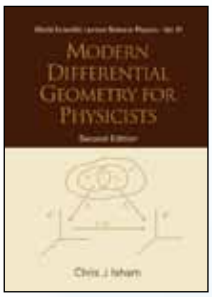

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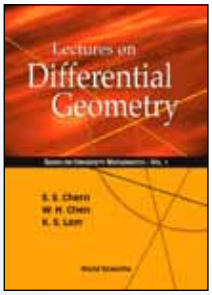

"This excellent and polished book may not be suitable for the very beginning student, but it is highly recommended for all mathematicians, from the advanced undergraduate student to the experienced professor. For many mathematicians it will be a work of reference for their research. It will be welcome by physicists."

Prof. F Hirzebruch
Max-Planck Institute, Bonn

This book is a translation of an authoritative introductory text based on a lecture series delivered by the renowned differential geometer, Professor S S Chern in Beijing University in 1980. The original Chinese text, authored by Professor Chern and Professor Wei-Huan Chen, was a unique contribution to the mathematics literature, combining simplicity and economy of approach with depth of contents. The present translation is aimed at a wide audience, including (but not limited to) advanced undergraduate and graduate students in mathematics, as well as physicists interested in the diverse applications of differential geometry to physics.

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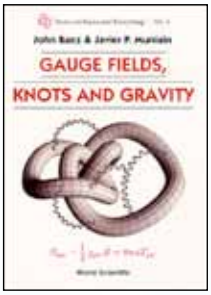

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