

Analysis and Differential Equations



SPECIAL FUNCTIONS

by **Z X Wang** (Peking University) & **D R Guo** (Peking University)

All time Bestseller

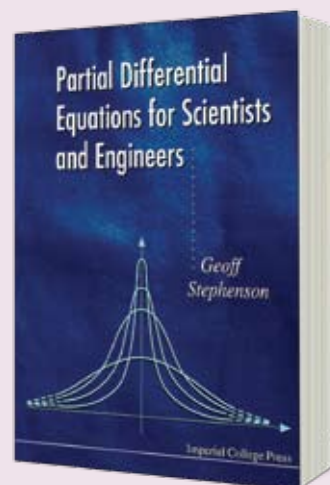
Contents: The Expansion of Functions in Infinite Series and Infinite Products; Linear Ordinary Differential Equations of the Second Order; The Gamma Function; Hypergeometric Function; Legendre Functions; Confluent Hypergeometric Functions; Bessel Functions; Weierstrass Elliptic Functions; Theta Functions; Jacobian Elliptic Functions; Lamé Functions and Mathieu Functions.

In January 1980 when I visited Beijing, Professor Z X Wang, my MSc thesis advisor of many years ago, gave me a copy of his book with Mr D R Guo on Special Functions. On many occasions in the later years, I had consulted the book for various things such as the hypergeometric series and the elliptic functions. The book is systematic, clear and to the point, as one would expect from Professor Wang's style and personality. It is great news that the book is now being published in an English translation. It will benefit many students and research workers who do not read Chinese."

Foreword by **C N Yang**
Nobel Laureate

720pp
978-9971-5-0659-9
978-9971-5-0667-4(pbk)

Oct 1989
US\$113 £81
US\$32 £22



PARTIAL DIFFERENTIAL EQUATIONS FOR SCIENTISTS AND ENGINEERS

by **Geoff Stephenson** (Imperial College, University of London, UK)

All time Bestseller

Partial differential equations form an essential part of the core mathematics syllabus for undergraduate scientists and engineers. The origins and applications of such equations occur in a variety of different fields, ranging from fluid dynamics, electromagnetism, heat conduction and diffusion, to quantum mechanics, wave propagation and general relativity.

This volume introduces the important methods used in the solution of partial differential equations. Written primarily for second-year and final-year students taking physics and engineering courses, it will also be of value to mathematicians studying mathematical methods as part of their course. The text, which assumes only that the reader has followed a good basic first-year ancillary mathematics course, is self-contained and is an unabridged republication of the third edition published by Longman in 1985.

176pp
978-1-86094-024-8(pbk)

Jul 1996
US\$29 £16

SPECTRAL THEORY OF RELATIVISTIC OPERATORS

by **A A Balinsky** (Cardiff University, UK) & **W D Evans** (Cardiff University, UK)

Forthcoming

Over the last decade, there has been considerable interest and progress in determining the spectral properties of various operators that take relativistic effects into account, with important implications for mathematics and physics. Difficulties are encountered in many-particle problems due to the lack of semiboundedness of the Dirac operator, and this has led to the investigation of operators like those of Chandrasekhar–Herbst and Brown–Ravenhall, which are semibounded under appropriate circumstances.

This book contains an up-to-date, comprehensive and self-contained analysis of the spectral properties of these operators, providing the tools for anyone working in this area. Another major feature is the work of the authors on zero modes, a topic which has important significance for the stability of matter and other physical problems. Up until now, these topics have been scattered throughout the literature, without a systematic and cohesive treatment. The book will report largely on the progress on these topics published since 1992.

300pp
978-1-84816-218-1

Aug 2010
US\$78 £59

Series on Partial Differential Equations and Applications

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Global Bifurcation and Exact Multiplicity
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Textbook

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.

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CLASSICAL COMPLEX ANALYSIS

A Geometric Approach (Volume 2)

by **I-Hsiung Lin** (*National Taiwan Normal University, Taiwan*)

Textbook

Classical Complex Analysis, available in two volumes, provides a clear, broad and solid introduction to one of the remarkable branches of exact science, with an emphasis on the geometric aspects of analytic functions. Volume 2 begins with analytic continuation. The Riemann mapping theorem is proved and used in solving Dirichlet's problem for an open disk and, hence, a class of general domains via Perron's method. Finally, proof of the uniformization theorem of Riemann surfaces is given.

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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 volume 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. It gives a detailed account of the modern compact schemes based on a "pure streamfunction" approach. In particular, a complete proof of convergence is given for the full nonlinear problem.

260pp Dec 2010
978-1-84816-275-4 US\$70 £53

THEORY OF COMPLEX FINSLER GEOMETRY AND GEOMETRY OF INTRINSIC METRICS

by **Pit-Mann Wong**
(*University of Notre Dame, USA*)

This book presents the theory of complex Finsler geometry by integrating the traditional differential geometric approach with the analytic approach of complex analysis and the algebraic approach of algebraic geometry. Finsler geometry is treated as a special case of the geometry associated with the complex Monge–Ampère equation. The theory of intrinsic metrics, especially the Kobayashi and the Caratheodory metrics, in complex analysis provides a wealth of important examples of complex Finsler manifolds. Furthermore, algebraic geometric techniques are very powerful in extending the classical Schwarz lemma, which is a highly indispensable tool in the classical theory of Finsler geometry and holomorphic curves, to more sophisticated and useful settings.

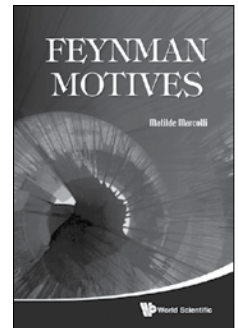
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Editor's Choice

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by **Matilde Marcolli**
(*California Institute of Technology, USA*)

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"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

236pp Dec 2009
978-981-4271-20-2 US\$48 £36
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by **Claudi Alsina** (*Universitat Politècnica de Catalunya, Spain*), **Justyna Sikorska** (*Silesian University, Poland*), & **M Santos Tomás** (*Universitat Politècnica de Catalunya, Spain*)

"This book is a nicely written and useful textbook with an excellent presentation of the state-of-the-art ... Specially remarkable are the very interesting sections dealing with the generalization of some basic geometrical properties of triangles ... the most salient feature of this book lies in the introduction of new techniques for solving functional equations and inequalities involving norm derivatives, as well as in the characterization of the Banach Spaces which are Hilbert Spaces."



Enric Trillas

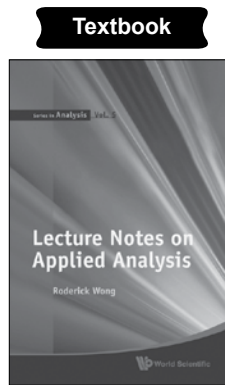
Emeritus Researcher, European Centre for Soft Computing
Mieres (Asturias), Spain

200pp Nov 2009
978-981-4287-26-5 US\$65 £49

Series in Analysis - Vol. 5
LECTURE NOTES ON APPLIED ANALYSIS

by **Roderick Wong**
(*City University of Hong Kong, Hong Kong*)

There are several subjects in analysis that are frequently used in applied mathematics, theoretical physics and engineering sciences, such as complex variable, ordinary differential equations, special functions, asymptotic methods, integral transforms and distribution theory. However, for graduate students or upper-level undergraduate students who are not going to specialize in these areas, there is no need for them to study these subjects in great depth. Instead, it would probably be more beneficial for them to have an introduction to these topics so that when the need arises, they know what approach to take. With this in mind, this set of lecture notes has been written for a one-semester course. Sufficient details have also been included to make it sufficiently adaptable for self-study. There are in total six chapters with each covering only a few topics. Furthermore, the chapters are all self-contained. The prerequisites for the readers of this book are advanced calculus, a first course in ordinary differential equations and elementary complex variable.



304pp Jan 2010
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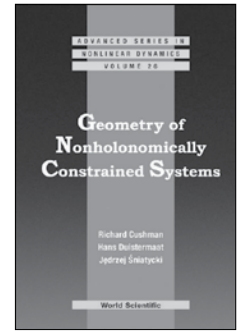
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Advanced Series in Nonlinear Dynamics - Vol. 26
GEOMETRY OF NONHOLONOMICALLY CONSTRAINED SYSTEMS

by **Richard Cushman** (*University of Calgary, Canada*), **Hans Duistermaat** (*University of Utrecht, The Netherlands*), & **J drzej niatycki** (*University of Calgary, Canada*)

This book gives a modern differential geometric treatment of linearly nonholonomically constrained systems. It discusses in detail what is meant by symmetry of such a system and gives a general theory of how to reduce such a symmetry using the concept of a differential space and the almost Poisson bracket structure of its algebra of smooth functions. The above theory is applied to the concrete example of Carathéodory's sleigh and the convex rolling rigid body. The qualitative behavior of the motion of the rolling disk is treated exhaustively and in detail. In particular, it classifies all motions of the disk, including those where the disk falls flat and those where it nearly falls flat.

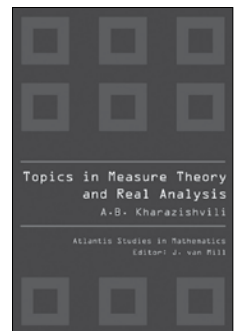


424pp Dec 2009
978-981-4289-48-1 US\$98 £74

Atlantis Studies in Mathematics - Vol. 2
TOPICS IN MEASURE THEORY AND REAL ANALYSIS

by **Alexander Kharazishvili** (*Razmadze Mathematical Institute, Republic of Georgia*)

This book highlights various topics on measure theory and vividly demonstrates that the different questions of this theory are closely connected with the central measure extension problem. Several important aspects of the measure extension problem are considered separately: set-theoretical, topological and algebraic. Also, various combinations (e.g., algebraic-topological) of these aspects are discussed by stressing their specific features. Several new methods are presented for solving the above mentioned problem in concrete situations. In particular, the following new results are obtained: the measure extension problem is completely solved for invariant or quasi-invariant measures on solvable uncountable groups; non-separable extensions of invariant measures are constructed by using their ergodic components; absolutely non-measurable additive functionals are constructed for certain classes of measures; the structure of algebraic sums of measure zero sets is investigated.



476pp Nov 2009
978-90-78677-20-8 US\$125 £94

Atlantis Studies in Mathematics for Engineering and Science - Vol. 5
THEORY OF CAUSAL DIFFERENTIAL EQUATIONS

by **V Lakshmikantham** (*Florida Institute of Technology, USA*), **S Leela** (*SUNY at Geneseo, USA*), **Z Drici** (*Illinois Wesleyan University, USA*), & **F A McRae** (*The Catholic University of America, USA*)

The theory of causal differential equations (CDE) includes several types of dynamic systems such as ordinary differential equations, functional differential equations, integro-differential equations (with or without memory), differential equations with anticipation and retardation. This is the first book which describes the theory of CDE as an independent discipline, incorporating the recent general theory of CDE and introducing several new ideas. This book is a timely introduction to the subject in a more generalised frame work.

220pp Jan 2010
978-90-78677-32-1 US\$85 £64

Advances in Fuzzy Systems-Applications and Theory
NONLINEAR INTEGRALS AND THEIR APPLICATIONS IN DATA MINING

by **Zhenyuan Wang** (University of Nebraska at Omaha, USA),
Rong Yang (Shen Zhen University, China), & **Kwong-Sak Leung** (Chinese University of Hong Kong, China)

Regarding the set of all feature attributes in a given database as the universal set, this monograph discusses various nonadditive set functions that describe the interaction among the contributions from feature attributes towards a considered target attribute. Then, the relevant nonlinear integrals are investigated. These integrals can be applied as aggregation tools in information fusion and data mining, such as synthetic evaluation, nonlinear multiregressions, and nonlinear classifications. Some methods of fuzzification are also introduced for nonlinear integrals such that fuzzy data can be treated and fuzzy information is retrievable.

400pp **Jun 2010**
978-981-281-467-8 **US\$84** **£45**

HOW TO MEASURE THE INFINITE Numerosities and Nonstandard Analysis

by **Vieri Benci** (Università di Pisa, Italy) & **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 **Jul 2010**
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CLASSICAL COMPLEX ANALYSIS A Geometric Approach(Volume 1)

by **I-Hsiung Lin** (National Taiwan Normal University, Taiwan)

Classical Complex Analysis, available in two volumes, provides a clear, broad and solid introduction to one of the remarkable branches of exact science, with an emphasis on the geometric aspects of analytic functions. Volume 1 begins with a geometric description of what a complex number is, followed by a detailed account of algebraic, analytic and geometric properties of standard complex-valued functions. Geometric properties of analytic functions are then developed and described in detail, and various applications of residues are included; analytic continuation is also introduced.

900pp **Apr 2010**
978-981-4261-22-7 **US\$118** **£89**
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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. The Segal-Bargmann transform or the heat transform, maps a square integrable function on a Euclidean space to a solution to the heat equation and this solution can be extended holomorphically to the complexification. The main ideas are introduced in the settings of a Euclidean space where only basic knowledge of analysis is needed. Those ideas are then presented in a more general and abstract framework. The connection to representation theory and infinite dimensional analysis is also discussed. We discuss the heat equation and the Segal-Bargmann transform on Riemannian symmetric spaces and the more general framework of the Heckmann-Opdam theory of hypergeometric functions associated to root systems.

300pp **Jul 2010**
978-981-4277-50-1 **US\$58** **£44**

Atlantis Studies in Mathematics for Engineering and Science - Vol. 6

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by **Goong Chen** (Texas A&M University, USA) & **Jianxin Zhou** (Texas A&M University, USA)

Boundary Element Methods provides a rigorous and systematic account of the modern mathematical theory of Boundary Element Methods, including the requisite background on general partial, differential equation methods, Sobolev spaces, pseudo-differential and Fredholm operators and finite elements. It aims at the computation of many types of elliptic boundary value problems in potential theory, elasticity, wave propagation, and structural mechanics. Also presented are various methods and algorithms for nonlinear partial differential equations.

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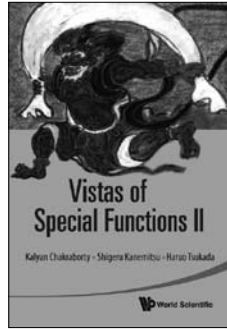
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 by **J J Koliha** (University of Melbourne, Australia)
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VISTAS OF SPECIAL FUNCTIONS II

by **Kalyan Chakraborty** (*Harish Chandra Research Institute, India*), **Shigeru Kanemitsu** (*Kinki University, Japan*), & **Haruo Tsukada** (*Kinki University, Japan*)



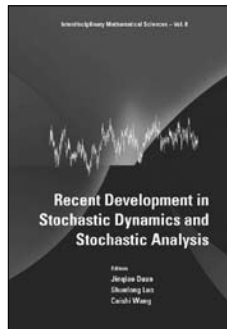
This book (Vista II), is a sequel to *Vistas of Special Functions* (World Scientific, 2007), in which the authors made a unification of several formulas scattered around the relevant literature under the guiding principle of viewing them as manifestations of the functional equations of associated zeta-functions. In Vista II, which maintains the spirit of the theory of special functions through zeta-functions, the authors base their theory on a theorem which gives some arithmetical Fourier series as intermediate modular relations — avatars of the functional equations. Vista II gives an organic and elucidating presentation of the situations where special functions can be effectively used. Vista II will provide the reader ample opportunity to find suitable formulas and the means to apply them to practical problems for actual research. It can even be used during tutorials for paper writing.

292pp **Oct 2009**
978-981-4273-97-8 **US\$85 £64**

Interdisciplinary Mathematical Sciences - Vol. 8

RECENT DEVELOPMENT IN STOCHASTIC DYNAMICS AND STOCHASTIC ANALYSIS

edited by **Jinqiao Duan** (*Illinois Institute of Technology, USA*), **Shunlong Luo** (*Chinese Academy of Sciences, China*), & **Caishi Wang** (*Northwest Normal University, China*)

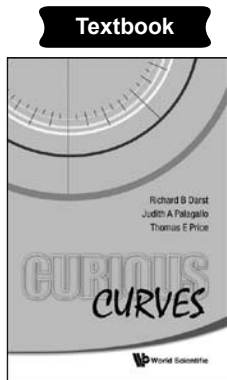


The volume reflects an essentially timely and interesting subject and offers reviews on the recent and new developments in stochastic dynamics and stochastic analysis, and also some possible future research directions. Presenting a dozen chapters of survey papers and research by leading experts in the subject, the volume is written with a wide audience in mind ranging from graduate students, junior researchers to professionals of other specializations who are interested in the subject.

308pp **Feb 2010**
978-981-4277-25-9 **US\$88 £66**

CURIOUS CURVES

by **Richard B Darst** (*Colorado State University, USA*), **Judith A Palagallo** (*The University of Akron, USA*), & **Thomas E Price** (*The University of Akron, USA*)



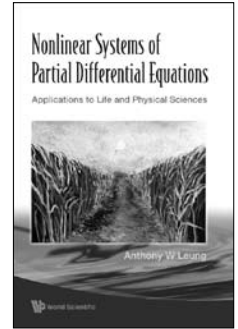
Curious Curves is self-contained and unified in presentation. This book is suitable for a topics course, capstone course, or senior seminar; it is also intended for independent study by students and others interested in mathematics.

Curves can often provide a better representation of natural phenomena than do the figures of classical geometry. Thus the content — presented with an emphasis on the geometric intuition characteristic of the study of curves — is highly relevant not only for people working in mathematics, but also those in other sciences. The explanations are detailed and illustrative to capture the interest of the reader, as well as complete to provide the necessary background information needed to go further into the subject.

232pp **Oct 2009**
978-981-4291-28-6 **US\$58 £44**

NONLINEAR SYSTEMS OF PARTIAL DIFFERENTIAL EQUATIONS

Applications to Life and Physical Sciences
by **Anthony W Leung**
(*University of Cincinnati, USA*)

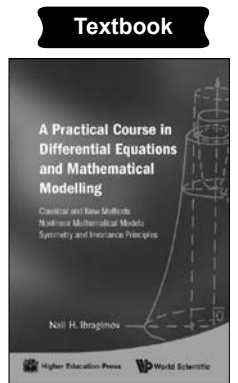


The book presents the theory of diffusion-reaction equations starting from the Volterra-Lotka systems developed in the eighties for Dirichlet boundary conditions. It uses the analysis of applicable systems of partial differential equations as a starting point for studying upper-lower solutions, bifurcation, degree theory and other nonlinear methods. It also illustrates the use of semigroup, stability theorems and $W^{2,p}$ theory. Introductory explanations are included in the appendices for non-expert readers.

544pp **Aug 2009**
978-981-4277-69-3 **US\$120 £90**

A PRACTICAL COURSE IN DIFFERENTIAL EQUATIONS AND MATHEMATICAL MODELLING

Classical and New Methods. Nonlinear Mathematical Models. Symmetry and Invariance Principles
by **Nail H Ibragimov**
(*Blekinge Institute of Technology, Sweden*)

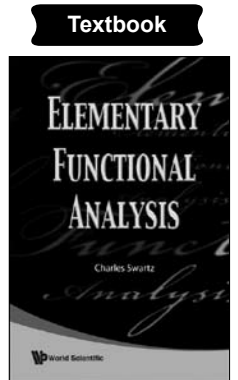


A Practical Course in Differential Equations and Mathematical Modelling is a unique blend of the traditional methods of ordinary and partial differential equations with Lie group analysis enriched by the author's own theoretical developments. The book — which aims to present new mathematical curricula based on symmetry and invariance principles — is tailored to develop analytic skills and “working knowledge” in both classical and Lie's methods for solving linear and nonlinear equations. This approach helps to make courses in differential equations, mathematical modelling, distributions and fundamental solution, etc. easy to follow and interesting for students. The book is based on the author's extensive teaching experience at Novosibirsk and Moscow universities in Russia, Collège de France, Georgia Tech and Stanford University in the United States, universities in South Africa, Cyprus, Turkey, and Blekinge Institute of Technology (BTH) in Sweden. The new curriculum prepares students for solving modern nonlinear problems and will essentially be more appealing to students compared to the traditional way of teaching mathematics.

364pp **Nov 2009**
978-981-4291-94-1 **US\$82 £62**

ELEMENTARY FUNCTIONAL ANALYSIS

by **Charles Swartz**
(*New Mexico State University, USA*)



This text is an introduction to functional analysis which requires readers to have a minimal background in linear algebra and real analysis at the first-year graduate level. Prerequisite knowledge of general topology or Lebesgue integration is not required. The book explains the principles and applications of functional analysis and explores the development of the basic properties of normed linear, inner product spaces and continuous linear operators defined in these spaces. Though Lebesgue integral is not discussed, the book offers an in-depth knowledge on the numerous applications of the abstract results of functional analysis in differential and integral equations, Banach limits, harmonic analysis, summability and numerical integration. Also covered in the book are versions of the spectral theorem for compact, symmetric operators and continuous, self adjoint operators.

192pp **Jul 2009**
978-981-4273-34-3 **US\$40 £30**

INTERNATIONAL JOURNAL OF MATHEMATICS (IJM)

The International Journal of Mathematics publishes original papers in mathematics in general, but giving a preference to those in the areas of mathematics represented by the editorial board. The journal has been published monthly except in June and December to bring out new results without delay. Occasionally, expository papers of exceptional value may also be published. The first issue appeared in March 1990.

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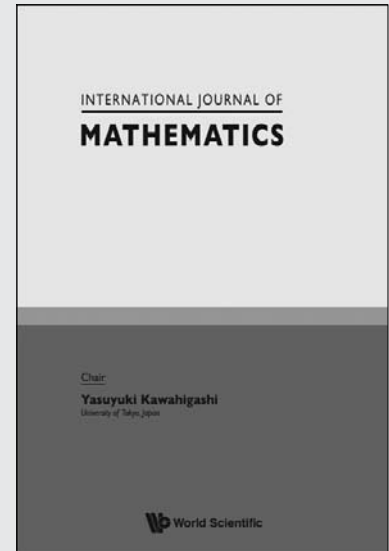
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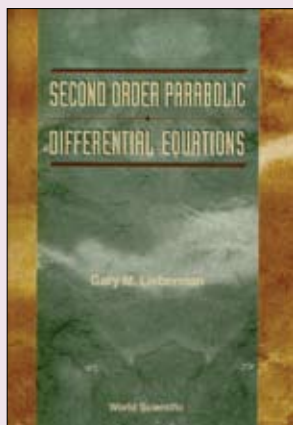
Maximal Plurisubharmonic Models
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(Scuola Normale Superiore, Italy) and
Sergio Venturini *(Università di Bologna, Italy)*



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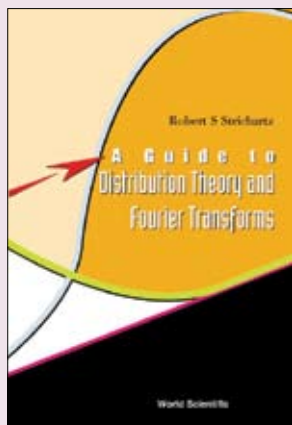
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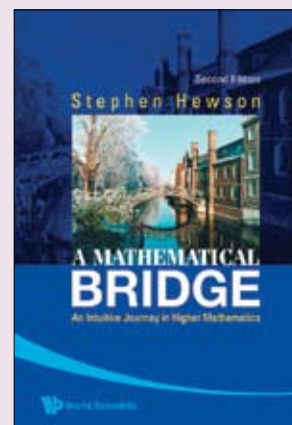
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