

**J. Chaskalovic**, Institut Jean le Rond d'Alembert, University Pierre and Marie Curie, Paris, France;  
**O. H. Del Brutto**, School of Medicine, Universidad Espiritu Santo - Ecuador, Guayaquil, Ecuador

## Mathematical and Numerical Methods for Partial Differential Equations

### Applications for Engineering Sciences

This self-tutorial offers a concise yet thorough introduction into the mathematical analysis of approximation methods for partial differential equation. A particular emphasis is put on finite element methods. The unique approach first summarizes and outlines the finite-element mathematics in general and then in the second and major part, formulates problem examples that clearly demonstrate the techniques of functional analysis via numerous and diverse exercises.

#### Features

► Self-learning and self-tutorial pedagogical book ► Provides students of engineering disciplines and mathematics the mathematical basis of systems of partial differential equations ► Uses a unique teaching method which explains the analysis using exercises and detailed solutions ► Enables active learning

#### Contents

Introduction to functional analytical methods of partial differential equations.- The finite element method.- Variational Formulations of elliptic boundary problems.- Finite Elements and differential Introduction to functional analytical methods of partial differential equations.- The finite element method.- Variational Formulations of elliptic boundary problems. [...]

#### Fields of interest

Numerical Analysis; Continuum Mechanics and Mechanics of Materials; Partial Differential Equations

#### Target groups

Research

#### Product category

Graduate/Advanced undergraduate textbook

**S. Chulkov**, Ingosstrakh ONDD Credit Insurance, Moscow, Russia; **A. Khovanskii**, University of Toronto Dept. Mathematics, Toronto, ON, Canada

## Geometry of the Semigroup $Z_{\geq 0}^n$ and its Applications to Combinatorics, Algebra and Differential Equations

Transl. English: **S. Chulkov**, Ingosstrakh ONDD Credit Insurance, Moscow, Russia

#### Features

► Unique collection of material on the topic ► Clear and as simple as possible presentation ► Wide range of problems considered ► Along with general theorems and constructions their most important special cases are considered in detail

#### Contents

I Geometry and combinatorics of semigroups.- 1 Elementary geometry of the semigroup  $Z_{\geq 0}^n$ .- 2 Properties of an ordered semigroup.- 3 Hilbert functions and their analogues.- II Applications: 4 Kouchnirenko's theorem on number of solutions of a polynomial system of equations. On the Grothendieck groups of the semigroup of finite subsets of  $Z^n$  and compact subsets of  $R^n$ .- 5 Differential Grobner bases and analytical theory of partial differential equations.- 6 On the Convergence of Formal Solutions of a System of Partial Differential Equations.- A Hilbert and Hilbert-Samuel polynomials and Partial Differential Equations.- References

#### Fields of interest

Geometry; Algebra; Combinatorics

#### Target groups

Graduate

#### Product category

Graduate/Advanced undergraduate textbook

**K. L. Chung**, Stanford University, Stanford, CA, USA;  
**R. J. Williams**, University of California at San Diego, La Jolla, CA, USA

## Introduction to Stochastic Integration

A highly readable introduction to stochastic integration and stochastic differential equations, this book combines developments of the basic theory with applications. It is written in a style suitable for the text of a graduate course in stochastic calculus, following a course in probability. Using the modern approach, the stochastic integral is defined for predictable integrands and local martingales; then its change of variable formula is developed for continuous martingales. Applications include a characterization of Brownian motion, Hermite polynomials of martingales, the Feynman-Kac functional and the Schrödinger equation. For Brownian motion, the topics of local time, reflected Brownian motion, and time change are discussed.

#### Features

► Affordable, softcover reprint of a classic textbook ► Authors' exposition consistently chooses clarity over brevity ► Includes an expanded collection of exercises from the first edition

#### Contents

1 Preliminaries.- 2 Definition of the Stochastic Integral.- 3 Extension of the Predictable Integrands.- 4 Quadratic Variation Process.- 5 The Ito Formula.- 6 Applications of the Ito Formula.- 7 Local Time and Tanaka's Formula.- 8 Reflected Brownian Motions.- 9 Generalization Ito Formula, Change of Time and Measure.- 10 Stochastic Differential Equations.- References.- Index.

#### Field of interest

Probability Theory and Stochastic Processes

#### Target groups

Research

#### Product category

Graduate/Advanced undergraduate textbook

Due January 2014

2014. XI, 329 p. 38 illus. Hardcover  
 ► \*€ (D) 64,19 | € (A) 65,99 | sFr 80,00  
 ► € 59,99 | £53.99  
 ISBN 978-3-319-03562-8



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Due October 2014

2014. Approx. 120 p. 8 illus. Hardcover  
 ► \*€ (D) 42,75 | € (A) 43,95 | sFr 53,50  
 ► € 39,95 | £35.99  
 ISBN 978-3-642-30987-8



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Due November 2013

2nd ed. 2014. XVII, 277 p. 10 illus. (Modern Birkhäuser Classics) Softcover  
 ► \*€ (D) 53,49 | € (A) 54,99 | sFr 67,00  
 ► € 49,99 | £44.99  
 ISBN 978-1-4614-9586-4



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H. M. Edwards, New York University, Courant Institute, New York, NY, USA

## Advanced Calculus

### A Differential Forms Approach

In a book written for mathematicians, teachers of mathematics, and highly motivated students, Harold Edwards has taken a bold and unusual approach to the presentation of advanced calculus. He begins with a lucid discussion of differential forms and quickly moves to the fundamental theorems of calculus and Stokes' theorem. The result is genuine mathematics, both in spirit and content, and an exciting choice for an honors or graduate course or indeed for any mathematician in need of a refreshingly informal and flexible reintroduction to the subject. For all these potential readers, the author has made the approach work in the best tradition of creative mathematics. This affordable softcover reprint of the 1994 edition presents the diverse set of topics from which advanced calculus courses are created in beautiful unifying generalization. The author emphasizes the use of differential forms in linear algebra, implicit differentiation in higher dimensions using the calculus of differential forms, and the method of Lagrange multipliers in a general but easy-to-use formulation.

#### Features

► Affordable reprint of a classic textbook Presents advanced calculus using the theory of differential forms ► Makes modern mathematics accessible to students via physical intuition and applications

#### Contents

Constant Forms.- Integrals.- Integration and Differentiation.- Linear Algebra.- Differential Calculus.- Integral Calculus.- Practical Methods of Solution.- Applications.- Further Study of Limits.- Appendices.- Answers to Exercises.- Index.

#### Fields of interest

Analysis; Functional Analysis; Real Functions

#### Target groups

Research

#### Product category

Graduate/Advanced undergraduate textbook

M. Emmer, Sapienza University of Rome, Rome, Italy (Ed)

## Imagine Math 3

### Between Culture and Mathematics

Imagine mathematics, imagine with the help of mathematics, imagine new worlds, new geometries, new forms. This volume in the series Imagine Math casts light on what is new and interesting in the relationships between mathematics, imagination, and culture.

#### Features

► A unique book with many papers on the various aspects of mathematics and culture ► Papers by experts in different topics, with a relevant numbers of images ► An interesting story that continues the series of math and culture

#### Contents

Science Fiction, Art and the Fourth Dimension.- From Modernity to Immortality: Art and Mathematics in the Twenties.- Geometrical Models and Imaginations.- From Sinigalli to Hiroshi Sugimoto.- Mathematical Narratives and the Surrealist Tradition.- Anxious Geometries.- Pasta By Design: The New Geometries of Pasta.- Photos, Objects and 3D Reconstructions.- Geometry, Numbers & Diagrams in the New York Art Scene around 1960.- The Islands of Benoit Mandelbrot: On the relationship between abstract reasoning and visual imagination.- Fractals and Nervous System.- New Mathematics and Architecture.- In search of the Lost Roots.- Probabilities and Traps of Intuition.- Sand grains and Earthquakes.- Henry Moore and Strings.- Fluid Architecture.- Sagrada Familia.- Fragments of an Existentialist Mathematics.- Living numbers

#### Fields of interest

Mathematics in Art and Architecture; Mathematics Education; Popular Science in Mathematics/Computer Science/Natural Science/Technology

#### Target groups

Upper undergraduate

#### Product category

Monograph

A. Freed, Saginaw Valley State University, Clifford H. Spicer Endowed Chair, University Center, MI, USA

## Soft Solids

### A Primer to the Theoretical Mechanics of Materials

This textbook presents the physical principles pertinent to the mathematical modeling of soft materials used in engineering practice, including both man-made materials and biological tissues. It is intended for seniors and masters-level graduate students in engineering, physics or applied mathematics. It will also be a valuable resource for researchers working in mechanics, biomechanics and other fields where the mechanical response of soft solids is relevant. Soft Solids: A Primer to the Theoretical Mechanics of Materials is divided into two parts.

#### Features

► Builds upon four experiments through each chapters and includes three additional unsolved experiments ► Presents a superior new theory of non-linear elasticity describing soft tissues and synthetic elastomers ► Viscoelasticity is presented from a physics perspective

#### Contents

Part I: Continuum Fields.- 1 Kinematics.- 2 Deformation.- 3 Strain.-4 Stress.- Part II: Constitutive Equations.- 5 Explicit Elasticity.-6 Implicit Elasticity.- 7 Viscoelasticity.- Appendices.- A Linear Algebra.- B Covariant and Contravariant Issues: Configuration Physics.- C Kronecker Products.- D General Linear ODE Solver.- E Solver for Convolution Integrals.- F Solver for the Mittag-Leer Function.- Bibliography.- Index.

#### Fields of interest

Functional Analysis; Soft and Granular Matter, Complex Fluids and Microfluidics; Mathematical Applications in the Physical Sciences

#### Target groups

Graduate

#### Product category

Graduate/Advanced undergraduate textbook

 Birkhäuser

Due November 2013

Originally published by Houghton Mifflin Company, Boston, 1969

2014. XIX, 508 p. 102 illus. (Modern Birkhäuser Classics) Softcover

► \*€ (D) 74,89 | € (A) 76,99 | sFr 93,50

► € 69,99 | £62.99

ISBN 978-0-8176-8411-2

Due March 2014

2014. X, 270 p. 50 illus. Hardcover

► approx. \*€ (D) 64,19 | € (A) 65,99 | sFr 80,00

► approx. € 59,99 | £53.99

ISBN 978-3-319-01230-8

Due February 2014

2014. XLI, 353 p. 57 illus., 1 in color. (Modeling and Simulation in Science, Engineering and Technology) Hardcover

► \*€ (D) 64,19 | € (A) 65,99 | sFr 80,00

► € 59,99 | £53.99

ISBN 978-3-319-03550-5



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L. Fridman, Universidad Nacional Autonoma De Mexico, México City, Mexico; A. Poznyak, Centro de Investigacion y Estudios Avanzados, México City, Mexico; F. J. Bejarano Rodríguez, ESIME Ticomán, Instituto Politecnico Nacional, México City, Mexico

## Robust Output LQ Optimal Control via Integral Sliding Modes

In the theory of optimal control, the linear quadratic (LQ) optimal problem plays an important role due to its physical meaning, and its solution is easily given by an algebraic Riccati equation.

### Features

► New approach used, with many design techniques unique to this book ► Minimal prerequisites: only a basic course in linear systems theory is needed ► For a broad audience of graduate students, practitioners, and researchers in engineering, mathematics, and optimal control theory

### Contents

1 Introduction.- Part I OPTIMAL CONTROL AND SLIDING MODE.- 2 Integral Sliding Mode Control.- 3 Observer Based on ISM.- 4 Output Integral Sliding Mode Based Control.- Part II MINI-MAX OUTPUT ROBUST LQ CONTROL.- 5 The Robust Maximum Principle.- 6 Multimodel and ISM Control.- 7 Multiplant and ISM Output Control.- Part III PRACTICAL EXAMPLES.- 8 Fault Detection.- 9 Stewart Platform.- 10 Magnetic Bearing.- Part IV APPENDIXES.- A Sliding Modes and Equivalent Control Concept.- B Min-Max Multimodel LQ Control.- Notations.- References.- Index.

### Fields of interest

Systems Theory, Control; Control; Calculus of Variations and Optimal Control; Optimization

### Target groups

Professional/practitioner

### Product category

Monograph

Due January 2014

2014. XV, 146 p. 40 illus., 34 in color. (Systems & Control: Foundations & Applications) Hardcover  
 ► approx. \*€ (D) 85,59 | € (A) 87,99 | sFr 107,50  
 ► approx. € 79,99 | £73.00  
 ISBN 978-0-8176-4961-6



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M. A. Goberna, M. A. López, University of Alicante, Alicante, Spain

## Post-Optimal Analysis in Linear Semi-Infinite Optimization

Post-Optimal Analysis in Linear Semi-Infinite Optimization examines the following topics in regards to linear semi-infinite optimization: modeling uncertainty, qualitative stability analysis, quantitative stability analysis and sensitivity analysis. Linear semi-infinite optimization (LSIO) deals with linear optimization problems where the dimension of the decision space or the number of constraints is infinite. The authors compare the post-optimal analysis with alternative approaches to uncertain LSIO problems and provide readers with criteria to choose the best way to model a given uncertain LSIO problem depending on the nature and quality of the data along with the available software. This work also contains open problems which readers will find intriguing a challenging.

### Features

► Depicts modeling uncertainty, qualitative stability analysis, quantitative stability analysis and sensitivity analysis in relation to linear semi-infinite optimization ► Emphasizes main concepts, results and technical aspects of linear semi-infinite optimization to readers in various fields ► Contains recent results on the emerging quantitative stability and sensitivity theories

### Contents

1. Preliminaries on Linear Semi-Infinite Optimization.- 2. Modeling uncertain Linear Semi-Infinite Optimization problems.- 3. Robust Linear Semi-infinite Optimization.- 4. Sensitivity analysis.- 5. Qualitative stability analysis.- 6. Quantitative stability analysis.

### Fields of interest

Operations Research, Management Science; Models and Principles; Programming Techniques

### Target groups

Research

### Product category

Brief

Due January 2014

2014. VI, 119 p. 26 illus., 21 in color. (SpringerBriefs in Optimization) Softcover  
 ► \*€ (D) 53,49 | € (A) 54,99 | sFr 67,00  
 ► € 49,99 | £44.99  
 ISBN 978-1-4899-8043-4



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S. Henc, Charles University, Prague 8, Czech Republic; P. Koskela, University of Jyväskylä, Jyväskylä, Finland

## Lectures on Mappings of Finite Distortion

In this book we introduce the class of mappings of finite distortion as a generalization of the class of mappings of bounded distortion. Connections with models of nonlinear elasticity are also discussed. We study continuity properties, behavior of our mappings on null sets, topological properties like openness and discreteness, regularity of the potential inverse mappings and many other aspects.

### Features

► Self-contained introduction to an active, important and interesting field of research ► Includes an Appendix with several basic results on Real Analysis, theory of Sobolev functions and Geometric Measure Theory ► Suitable for any PhD student looking for an introduction to the subject

### Contents

Introduction.- Continuity.- Openness and discreteness.- Images and preimages of null sets.- Homeomorphisms of finite distortion.- Integrability of  $J_f$  and  $1/J_f$ .- Final comments.- Appendix.- References.

### Fields of interest

Analysis; Functions of a Complex Variable; Functional Analysis

### Target groups

Research

### Product category

Monograph

Due January 2014

2014. X, 158 p. 4 illus. (Lecture Notes in Mathematics, Volume 2096) Softcover  
 ► \*€ (D) 37,44 | € (A) 38,49 | sFr 47,00  
 ► € 34,99 | £31.99  
 ISBN 978-3-319-03172-9



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T. Kaiser, Universität Passau Fakultät f. Informatik u. Mathematik, Passau, Germany; M. Knebusch, Universität Regensburg Fak. Naturwissenschaft I, Regensburg, Germany

## Manis Valuations and Prüfer Extensions II

This volume is a sequel to "Manis Valuation and Prüfer Extensions I," LNM1791. The Prüfer extensions of a commutative ring  $A$  are roughly those commutative ring extensions  $R/A$ , where commutative algebra is governed by Manis valuations on  $R$  with integral values on  $A$ . These valuations then turn out to belong to the particularly amenable subclass of PM (=Prüfer-Manis) valuations. While in Volume I Prüfer extensions in general and individual PM valuations were studied, now the focus is on families of PM valuations. One highlight is the presentation of a very general and deep approximation theorem for PM valuations, going back to Joachim Gräter's work in 1980, a far-reaching extension of the classical weak approximation theorem in arithmetic. Another highlight is a theory of so called "Kronecker extensions," where PM valuations are put to use in arbitrary commutative ring extensions in a way that ultimately goes back to the work of Leopold Kronecker.

### Contents

Overrings and PM-Spectra.- Approximation Theorems.- Kronecker extensions and star operations.- Basics on Manis valuations and Prüfer extensions.- Multiplicative ideal theory.- PM-valuations and valuations of weaker type.- Overrings and PM-Spectra.- Approximation Theorems.- Kronecker extensions and star operations.- Appendix.- References.- Index.

### Field of interest

Commutative Rings and Algebras

### Target groups

Research

### Product category

Monograph

Due January 2014

2014. X, 188 p. (Lecture Notes in Mathematics, Volume 2103) Softcover

▶ \*€ (D) 37,44 | € (A) 38,49 | sFr 47,00

▶ € 34,99 | £31.99

ISBN 978-3-319-03211-5



9 783319 032115

P. E. Kloeden, Goethe University, Frankfurt am Main, Germany; C. Poetsche, Alpen-Adria University, Klagenfurt, Austria (Eds)

## Nonautonomous Dynamical Systems in the Life Sciences

Nonautonomous dynamics describes the qualitative behavior of evolutionary differential and difference equations, whose right-hand side is explicitly time dependent. Over recent years, the theory of such systems has developed into a highly active field related to, yet recognizably distinct from that of classical autonomous dynamical systems. This development was motivated by problems of applied mathematics, in particular in the life sciences where genuinely nonautonomous systems abound.

### Features

▶ Overview of recent developments in the theory of nonautonomous dynamical systems ▶ Examples of concepts and techniques in the context of simple models from the life sciences ▶ Representative collection of nonautonomous dynamical systems in the life sciences

### Contents

Nonautonomous dynamical systems in the life sciences.- Random dynamical systems with inputs.- Canard theory and excitability.- Stimulus-response reliability of biological networks.- Coupled nonautonomous oscillators.- Multisite mechanisms for ultrasensitivity in signal transduction.- Mathematical concepts in pharmacokinetics and pharmacodynamics with application to tumor growth.- Viral kinetic modeling of chronic hepatitis C and B infection.- Some classes of stochastic differential equations as an alternative modeling approach to biomedical problems.

### Fields of interest

Dynamical Systems and Ergodic Theory; Mathematical and Computational Biology; Genetics and Population Dynamics

### Target groups

Research

### Product category

Contributed volume

Due December 2013

2014. X, 310 p. 66 illus., 31 in color. (Lecture Notes in Mathematics / Mathematical Biosciences Subseries, Volume 2102) Softcover

▶ \*€ (D) 74,89 | € (A) 76,99 | sFr 93,50

▶ € 69,99 | £62.99

ISBN 978-3-319-03079-1



9 783319 030791

V. Korolyuk, National Academy of Sciences of Ukraine, Kyiv, Ukraine; N. Limnios, Université de Technologie de Compiègne, Compiègne Cedex, France; Y. Mishura, L. Sakhno, G. Shevchenko, Taras Shevchenko National University of Kyiv, Kyiv, Ukraine (Eds)

## Modern Stochastics and Applications

### Contents

Part I: Probability Distributions in Applications.- Comparing Brownian stochastic integrals for the convex order (Yor, Hirsch).- Application of  $\varphi$ -sub-Gaussian random processes in queueing theory (Kozachenko, Yamnenko).- A review on time-changed pseudo processes and the related distributions (Orsingher).- Reciprocal processes: a stochastic analysis approach (Roelly). Part II: Stochastic Equations.- Probabilistic counterparts of nonlinear parabolic PDE systems (Belopolskaya).- Finite-time blowup and existence of global positive solutions of semilinear SPDE's with fractional noise (Dozzi, Kolkovska, López-Mimbela).- Hydrodynamics and SDE with Sobolev coefficients (Fang).- Elementary pathwise methods for non-linear parabolic and transport type SPDE with fractal noise (Hinz, Issoglio, Zähle).- SPDE's driven by general stochastic measures (Radchenko). Part III: Limit Theorems.- Exponential convergence of multi-dimensional stochastic mechanical systems with switching (Anulova, Veretennikov).- Asymptotic behaviour of the distribution density of the fractional Lévy motion (Kulik, Knopova).- Large deviations for random evolutions in the scheme of asymptotically small diffusion (Koroliuk, Samoilenko).- Limit theorems for excursion sets of stationary random fields (Spodarev). Part IV: Finance and Risk. [...]

### Fields of interest

Calculus of Variations and Optimal Control; Optimization; Probability Theory and Stochastic Processes; Linear and Multilinear Algebras, Matrix Theory

### Target groups

Research

### Product category

Contributed volume

Due January 2014

2014. VIII, 332 p. 2 illus., 1 in color. (Springer Optimization and Its Applications, Volume 90) Hardcover

▶ \*€ (D) 101,64 | € (A) 104,49 | sFr 126,50

▶ € 94,99 | £85.50

ISBN 978-3-319-03511-6



9 783319 035116

R. Kress, Georg-August-Universität Göttingen  
Institut fuer Numerische und Angewandte,  
Göttingen, Germany

## Linear Integral Equations

This book combines theory, applications, and numerical methods, and covers each of these fields with the same weight. In order to make the book accessible to mathematicians, physicists, and engineers alike, the author has made it as self-contained as possible, requiring only a solid foundation in differential and integral calculus. The functional analysis which is necessary for an adequate treatment of the theory and the numerical solution of integral equations is developed within the book itself. Problems are included at the end of each chapter. For this third edition in order to make the introduction to the basic functional analytic tools more complete the Hahn–Banach extension theorem and the Banach open mapping theorem are now included in the text.

### Features

► Complete basis in functional analysis including the Hahn-Banach and the open mapping theorem  
► More on boundary integral equations in Sobolev spaces  
► New developments in collocation methods via trigonometric polynomials

### Contents

Normed Spaces.- Bounded and Compact Operators.- Riesz Theory.- Dual Systems and Fredholm Alternative.- Regularization in Dual Systems.- Potential Theory.- Singular Integral Equations.- Sobolev Spaces.- The Heat Equation.- Operator Approximations.- Degenerate Kernel Approximation.- Quadrature Methods.- Projection Methods.- Iterative Solution and Stability.- Equations of the First Kind.- Tikhonov Regularization.- Regularization by Discretization.- Inverse Boundary Value Problems.- References.- Index.

### Fields of interest

Analysis; Numerical Analysis; Measure and Integration

### Target groups

Graduate

### Product category

Graduate/Advanced undergraduate textbook

Due January 2014

3rd ed. 2014. X, 426 p. 1 illus. (Applied Mathematical Sciences, Volume 82) Hardcover

► \*€ (D) 64,19 | € (A) 65,99 | sFr 80,00

► € 59,99 | £53.99

ISBN 978-1-4614-9592-5



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T. Kumagai, Kyoto University, Kyoto, Japan

## Random Walks on Disordered Media and their Scaling Limits

École d'Été de Probabilités de Saint-Flour  
XL - 2010

In these lecture notes, we will analyze the behavior of random walk on disordered media by means of both probabilistic and analytic methods, and will study the scaling limits. We will focus on the discrete potential theory and how the theory is effectively used in the analysis of disordered media. The first few chapters of the notes can be used as an introduction to discrete potential theory. Recently, there has been significant progress on the theory of random walk on disordered media such as fractals and random media. Random walk on a percolation cluster ('the ant in the labyrinth') is one of the typical examples. In 1986, H. Kesten showed the anomalous behavior of a random walk on a percolation cluster at critical probability.

### Features

► Starts from basics on discrete potential theory  
► Contains many interesting examples of disordered media with anomalous heat conduction  
► Anomalous behavior of random walk at criticality on random media  
► Contains recent developments on random conductance models

### Contents

Introduction.- Weighted graphs and the associated Markov chains.- Heat kernel estimates – General theory.- Heat kernel estimates using effective resistance.- Heat kernel estimates for random weighted graphs.- Alexander-Orbach conjecture holds when two-point functions behave nicely.- Further results for random walk on IIC.- Random conductance model.

### Fields of interest

Probability Theory and Stochastic Processes; Mathematical Physics; Potential Theory

### Target groups

Research

### Product category

Monograph

Due January 2014

2014. X, 134 p. 5 illus. (Lecture Notes in Mathematics / École d'Été de Probabilités de Saint-Flour, Volume 2101) Softcover

► \*€ (D) 37,44 | € (A) 38,49 | sFr 47,00

► € 34,99 | £31.99

ISBN 978-3-319-03151-4



9 783319 031514

P. D. Lax, New York University Department of  
Mathematics, New York, NY, USA

P. Sarnak, Princeton University Inst. Advanced Study,  
Princeton, NJ, USA; A. J. Majda, New York University  
Department of Mathematics, New York, NY, USA (Eds)

## Selected Papers I

A renowned mathematician who considers himself both applied and theoretical in his approach, Peter Lax has spent most of his professional career at NYU, making significant contributions to both mathematics and computing. He has written several important published works and has received numerous honors including the National Medal of Science, the Lester R. Ford Award, the Chauvenet Prize, the Semmelweis Medal, the Wiener Prize, and the Wolf Prize. Several students he has mentored have become leaders in their fields. Two volumes span the years from 1952 up until 1999, and cover many varying topics, from functional analysis, partial differential equations, and numerical methods to conservation laws, integrable systems and scattering theory. After each paper, or collection of papers, is a commentary placing the paper in context and where relevant discussing more recent developments. Many of the papers in these volumes have become classics and should be read by any serious student of these topics. In terms of insight, depth, and breadth, Lax has few equals. The reader of this selecta will quickly appreciate his brilliance as well as his masterful touch.

### Contents

Preface.- Table of Contents.- List of Publications.- Partial Differential Equations.- Difference Approximations to PDE.- Hyperbolic Systems of Conservation Laws.- Integrable Systems.- Integrable Systems.

### Fields of interest

Analysis; Abstract Harmonic Analysis; Difference and Functional Equations

### Target groups

Research

### Product category

Collected works

Due December 2013

Only available in print

2005. Reprint 2013 of the 2005 edition. XX, 620 p. (Springer Collected Works in Mathematics) Softcover

► \*€ (D) 64,19 | € (A) 65,99 | sFr 80,00

► € 59,99 | £53.99

ISBN 978-1-4614-9432-4



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**P. D. Lax**, New York University Department of Mathematics, New York, NY, USA  
**P. Sarnak**, Princeton University Inst. Advanced Study, Princeton, NJ, USA; **A. J. Majda**, New York University Department of Mathematics, New York, NY, USA (Eds)

## Selected Papers II

A renowned mathematician who considers himself both applied and theoretical in his approach, Peter Lax has spent most of his professional career at NYU, making significant contributions to both mathematics and computing. He has written several important published works and has received numerous honors including the National Medal of Science, the Lester R. Ford Award, the Chauvenet Prize, the Semmelweis Medal, the Wiener Prize, and the Wolf Prize. Several students he has mentored have become leaders in their fields. Two volumes span the years from 1952 up until 1999, and cover many varying topics, from functional analysis, partial differential equations, and numerical methods to conservation laws, integrable systems and scattering theory. After each paper, or collection of papers, is a commentary placing the paper in context and where relevant discussing more recent developments. Many of the papers in these volumes have become classics and should be read by any serious student of these topics. In terms of insight, depth, and breadth, Lax has few equals. The reader of this selecta will quickly appreciate his brilliance as well as his masterful touch.

### Contents

List of Publications.- Acknowledgment.- Scattering Theory in Euclidean Space.- Scattering Theory for Automorphic Functions.- Functional Analysis.- Analysis.- Algebra.

### Fields of interest

Analysis; Abstract Harmonic Analysis; Difference and Functional Equations

### Target groups

Research

### Product category

Collected works

Due December 2013

Only available in print

2005. Reprint 2013 of the 2005 edition. XVIII, 592 p. (Springer Collected Works in Mathematics) Softcover  
 ▶ \*€ (D) 64,19 | € (A) 65,99 | sFr 80,00  
 ▶ € 59,99 | £53.99  
 ISBN 978-1-4614-9431-7



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**J. Leray**, Heidelberg, Germany  
**P. Malliavin**, Paris CX, France (Ed)

## Selected Papers - Oeuvres Scientifiques I

Introduction by: A. Borel

Jean Leray (1906-1998) was one of the great French mathematicians of his century. His life's work divides into 3 major areas, reflected in these 3 volumes. Volume I, to which an Introduction has been contributed by A. Borel, covers Leray's seminal work in algebraic topology, where he created sheaf theory and discovered the spectral sequences. Volume II, with an introduction by P. Lax, covers fluid mechanics and PDE: Leray demonstrated the existence of the infinite-time extension of weak solutions of the Navier-Stokes equations; 60 years later this profound work has retained all its impact. Volume III, on the theory of several complex variables, has a long introduction by G. Henkin. Leray's work on the ramified Cauchy problem will stand for centuries alongside the Cauchy-Kovalevskia theorem for the unramified case. He was awarded the Malaxa Prize (1938), the Grand Prix in mathematical sciences (1940), the Feltrinelli Prize (1971), the Wolf Prize in Mathematics (1979), and the Lomonosov Gold Medal (1988).

### Contents

Jean Leray: Selected Papers - Oeuvres Scientifiques.- Vol. 1: Topology and Fixed Point Theorems with an Introduction by Armand Borel.- Vol. 2: Fluid Dynamics and Real Partial Differential Equations with an Introduction by Peter Lax.- Vol. 3: Several Complex Variables and Holomorphic Partial Differential Equations with an Introduction by Guennadi Henkin.

### Fields of interest

Algebraic Topology; Partial Differential Equations; Several Complex Variables and Analytic Spaces

### Target groups

Research

### Product category

Collected works

Due December 2013

Jointly published with the collaboration of the Société Mathématique de France, France

Only available in print

1998. Reprint 2013 of the 1998 edition. X, 508 p. (Springer Collected Works in Mathematics) Softcover  
 ▶ approx. \*€ (D) 64,19 | € (A) 65,99 | sFr 80,00  
 ▶ approx. € 59,99 | £53.99  
 ISBN 978-3-642-41847-1



9 783642 418471

**C. Parés**, Universidad de Malaga, Malaga, Spain;  
**C. Vazquez Cendon**, Universidad de La coruna, La Coruna, Spain; **F. Coquel**, CNRS and Ecole Polytechnique, Paris, France (Eds)

## Advances in Numerical Simulation in Physics and Engineering

Lecture Notes of the XV 'Jacques-Louis Lions' Spanish-French School

### Contents

1 Begona Calvo and Estefania Pena: Fundamental aspects in modeling the constitutive behaviour of the fibered soft tissues.- 2 Enrique D. Fernandez Nieto: Some remarks on avalanche modeling. An introduction to shallow flow models.- 3 Emmanuel Gobet: Introduction to stochastic calculus and to the resolution of PDEs using Monte Carlo simulations.- 4 Philippe G. LeFloch: Structure-preserving shock-capturing methods and applications.- 5 Carlos Castro: Numerical approximation of optimal design problems in aerodynamics. From the mathematical analysis to industrial codes.- 6 Michel Langlais: A further multiscale problem: spatio-temporal spread of an airborne plant pathogen though a highly anthropized nad sapatially structured crop system.- 7 Fabien Mangeant: Statistical learning and computer experiment for uncertainty management in Engeneering.- 8 Emanuelle Schiavi: Medical image processing: mathematical modeling and numerical resolution.- 9 Denis Talay: On probabilistic approaches for divergence from operators with discontinuos coefficient.

### Fields of interest

Mathematical Modeling and Industrial Mathematics; Computational Mathematics and Numerical Analysis; Partial Differential Equations

### Target groups

Graduate

### Product category

Contributed volume

Due April 2014

2014. Approx. 250 p. 55 illus., 15 in color. (SEMA SIMAI Springer Series, Volume 3) Hardcover  
 ▶ approx. \*€ (D) 96,29 | € (A) 98,99 | sFr 120,00  
 ▶ approx. € 89,99 | £81.00  
 ISBN 978-3-319-02838-5



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A. Quarteroni, École Polytechnique Fédérale de Lausanne Chaire de Modelisation, Lausanne, Switzerland

## Matematica Numerica Esercizi, Laboratori e Progetti

La Matematica Numerica è una disciplina che si sviluppa in simbiosi con il calcolatore. Questo testo propone, oltre a richiami degli argomenti fondamentali, sia Esercizi teorici da risolvere "con carta e penna", atti a far comprendere meglio al lettore la teoria, sia Laboratori, in cui per un dato problema si debbono scegliere gli algoritmi più adatti, realizzare un programma in linguaggio Matlab per la loro implementazione, infine rappresentare, interpretare ed analizzare alla luce della teoria i risultati numerici.

### Features

► La sinergia fra richiami teorici, Esercizi e Laboratori consente di comprendere appieno gli argomenti fondamentali della Matematica Numerica ► I Progetti, svolti in modo dettagliato, mostrano alcune applicazioni significative delle tecniche numeriche studiate ► Il software di Calcolo Scientifico Matlab è introdotto in maniera progressiva e dettagliata. Inoltre, grazie ai Laboratori e ai Progetti, lo studente ha modo di esplorare una gamma crescente di potenzialità del software

### Contents

1 Matlab in 1h30'.- 2 Fondamenti di algebra lineare numerica.- 3 Sistemi lineari.- 4 Approssimazione di autovalori e autovettori.- 5 Equazioni non lineari.- 6 Interpolazione polinomiale.- 7 Integrazione.- 8 Equazioni differenziali ordinarie.- 9 Progetti svolti.

### Fields of interest

Numerical Analysis; Computational Mathematics and Numerical Analysis; Computational Science and Engineering

### Target groups

Lower undergraduate

### Product category

Libro di testo introduttivo

S. I. Resnick, Cornell University, Ithaca, NY, USA

## A Probability Path

Many probability books are written by mathematicians and have the built-in bias that the reader is assumed to be a mathematician coming to the material for its beauty. This textbook is geared towards beginning graduate students from a variety of disciplines whose primary focus is not necessarily mathematics for its own sake. Instead, A Probability Path is designed for those requiring a deep understanding of advanced probability for their research in statistics, applied probability, biology, operations research, mathematical finance and engineering. A one-semester course is laid out in an efficient and readable manner covering the core material. The first three chapters provide a functioning knowledge of measure theory.

### Features

► Affordable, softcover reprint of a classic textbook ► Mathematically rigorous treatment aimed at non-mathematicians ► Includes a clear outline for a one-semester course

### Contents

1 Sets and Events.- 2 Probability Spaces.- 3 Random Variables, Elements and Measurable Maps.- 4 Independence.- 5 Integration and Expectation.- 6 Convergence Concepts.- 7 Laws of Large Numbers and Sums of Independent Random Variables.- 8 Convergence in Distribution.- 9 Characteristic Functions and the Central Limit Theorem.- 10 Martingales.- Index.- References.

### Fields of interest

Probability Theory and Stochastic Processes; Applications of Mathematics; Operations Research, Management Science

### Target groups

Research

### Product category

Graduate/Advanced undergraduate textbook

M. E. Schmidt, University of Göttingen, Göttingen, Germany

## Integrating Routing Decisions in Public Transportation Problems

This book treats three planning problems arising in public railway transportation planning: line planning, timetabling, and delay management, with the objective to minimize passengers' travel time. While many optimization approaches simplify these problems by assuming that passengers' route choice is independent of the solution, this book focuses on models which take into account that passengers will adapt their travel route to the implemented planning solution. That is, a planning solution and passengers' routes are determined and evaluated simultaneously.

### Features

► Provides insight into which factors influence public transportation problems via extensive complexity analysis ► Contains a new model for customer-oriented public transportation problems, resulting in more objective solutions ► Provides a framework in which methods for optimization and routing can be combined to solve network problems with integrated routing ► Presents exact integer programming approaches as well as a heuristic approach which alternates traffic assignment and optimization steps

### Contents

1. Introduction.- 2. Line Planning.- 3. Timetabling.- 4. Delay Management.- 5. An Iterative Solution Approach for General Network Problems with Routing.- 6. Conclusions and Outlook.- Frequently Used Notation.- References.- Index.

### Fields of interest

Operations Research, Management Science; Civil Engineering; Algorithm Analysis and Problem Complexity

### Target groups

Research

### Product category

Monograph

 Birkhäuser

Pubblicazione prevista per il mese di December 2013

2a ed. 2013. XVIII, 382 pagg. (UNITEXT / La Matematica per il 3+2, Volume 75) Brossura  
► approx. \*€ (D) 41,14 | € (A) 42,30 | sFr 51,50  
► approx. € 38,45 | £34.99  
ISBN 978-88-470-5540-7

Due November 2013

2014. XIV, 453 p. 11 illus. (Modern Birkhäuser Classics) Softcover  
► \*€ (D) 64,19 | € (A) 65,99 | sFr 80,00  
► € 59,99 | £53.99  
ISBN 978-0-8176-8408-2

Due January 2014

2014. XII, 200 p. 23 illus. (Springer Optimization and Its Applications, Volume 89) Hardcover  
► \*€ (D) 90,94 | € (A) 93,49 | sFr 113,50  
► € 84,99 | £76.50  
ISBN 978-1-4614-9565-9



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A. Soifer, University of Colorado at Colorado Springs, Colorado Springs, CO, USA

## Life and Fate: In Search of van der Waerden

Bartel Leendert van der Waerden was a distinguished algebraist, physicist, statistician, historian, author, and above all one of the leading algebraic geometers of his time. He made major contributions to algebraic geometry, abstract algebra, quantum mechanics, and other fields. He liberally published on the history of mathematics. Among the many books he wrote, the 2-volume work "Moderne Algebra" is one of the most influential and popular mathematical books ever written.

It is therefore surprising that no monograph has been dedicated to his life and work. B.L. van der Waerden is not an easy person to understand. In attempting to understand his life, the author assembled thousands of documents from numerous archives in Germany, the Netherlands, Switzerland and the United States which revealed fascinating and often surprising new information about van der Waerden. Soifer traces van der Waerden's early years in a family of great Dutch public servants and his time as professor in Leipzig during the entire Nazi period. We encounter heroes and villains and a much more numerous group in between these two extremes.

### Features

► First monograph on van der Waerden's life and work ► Written by a lively storyteller ► New research and details on van der Waerden

### Contents

Preface.- Greetings to the Reader.- The Early Years.- The Nazi Leipzig.- The Post-War Amsterdam.- The Unsettling Years.- Summing Up.- Appendix: Two Lives Between Two Wars: Issai Schur and Pierre Joseph Henry Baudet.

### Field of interest

History of Mathematical Sciences

### Target groups

Research

### Product category

Biography

J. Xin, University of California, Irvine Dept. Mathematics, Irvine, CA, USA; Y. Qi, University of California, Irvine, Irvine, CA, USA

## Mathematical Modeling and Signal Processing in Speech and Hearing Sciences

The aim of the book is to give an accessible introduction of mathematical models and signal processing methods in speech and hearing sciences for senior undergraduate and beginning graduate students with basic knowledge of linear algebra, differential equations, numerical analysis, and probability.

### Features

► User friendly and systematic introduction to mathematical models in speech and hearing sciences ► Step by step analysis of models and computational methods from numerical analysis, signal processing and statistics ► Connect mathematics and computation with speech/hearing phenomena and signal processing ► Hands-on MATLAB programs to simulate models and analyze data, results come quickly (most of them in seconds) for seeing and hearing, directly enhancing learning experience

### Contents

1 Background Signal Processing, Statistical and Optimization Methods.- 2 Speech Modeling.- 3 Auditory Modeling.- 4 Speech Recognition.- 5 Blind Source Separation and Speech Enhancement.

### Fields of interest

Applications of Mathematics; Statistics for Engineering, Physics, Computer Science, Chemistry and Earth Sciences; Math Applications in Computer Science

### Target groups

Upper undergraduate

### Product category

Monograph

Due July 2014

2014. Approx. 350 p. 50 illus. Hardcover

► approx. \* € (D) 101,64 | € (A) 104,49 | sFr 126,50

► approx. € 94,99 | £85.50

ISBN 978-3-0348-0711-1



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Due December 2013

2014. XII, 208 p. (MS&A, Volume 10) Hardcover

► \* € (D) 90,94 | € (A) 93,49 | sFr 113,50

► € 84,99 | £76.50

ISBN 978-3-319-03085-2