

OXFORD LECTURE SERIES IN MATHEMATICS AND ITS APPLICATIONS

Flips for 3-folds and 4-folds

Edited by **Alessio Corti**, Department of Mathematics, Imperial College, London

This edited collection of chapters, authored by leading experts, provides a complete and essentially self-contained construction of 3-fold and 4-fold klt flips. A large part of the text is a digest of Shokurov's work in the field and a concise, complete and pedagogical proof of the existence of 3-fold flips is presented. The text includes a ten page glossary and is accessible to students and researchers in algebraic geometry.



Oxford Lecture Series in Mathematics and Its Applications No. 35

June 2007 | 200 pages

978-0-19-857061-5, HARDBACK

£39.50/\$80.00

Mathematical Geophysics

An Introduction to Rotating Fluids and the Navier-Stokes Equations

Jean-Yves Chemin, Laboratoire J.-L. Lions, University of Paris 6, France, **Benoit Desjardins**, Centre of Atomic Studies, France, **Isabelle Gallagher**, Institut de Mathématiques de Jussieu, University of Paris 7, France, and **Emmanuel Grenier**, École Normale Supérieure de Lyon, France

Aimed at graduate students and researchers in mathematics, engineering, oceanography, meteorology and mechanics, this text provides a detailed introduction to the physical theory of rotating fluids, a significant part of geophysical fluid dynamics. The Navier-Stokes equations are examined in both incompressible and rapidly rotating forms.



Oxford Lecture Series in Mathematics and Its Applications No. 32

2006 | 272 pages

978-0-19-857133-9, HARDBACK

£47.00/\$79.50

The Dynamical Yang-Baxter Equation, Representation Theory, and Quantum Integrable Systems

Pavel Etingof and **Frederic Latour**, both at Department of Mathematics, Massachusetts Institute of Technology

'The book, which comprises nine chapters, is very well written, starting almost from scratch and containing detailed proofs of all statements as well as motivating discussions. It is ideal for a graduate course on quantum groups and special functions.'

Mathematical Reviews

'This monograph provides an excellent introduction to the theory of the quantum dynamical Yang-Baxter equation from the point of view of (quantum) integrable systems and special function theory.'

Mathematical Reviews

The text is based on an established graduate course given at MIT that provides an introduction to the theory of the dynamical Yang-Baxter equation and its applications, which is an important area in representation theory and quantum groups. The book, which contains many detailed proofs and explicit calculations, will be accessible to graduate students of mathematics, who are familiar with the basics of representation theory of semisimple Lie algebras.

Oxford Lecture Series in Mathematics and Its Applications No. 29

2005 | 150 pages

978-0-19-853068-8, HARDBACK

£41.00/\$89.50

The Factorization Method for Inverse Problems

Andreas Kirsch and **Natalia Grinberg**, both at University of Karlsruhe

The factorization method is a relatively new method for solving certain types of inverse scattering problems and problems in tomography. Aimed at students and researchers in Applied Mathematics, Physics and Engineering, this text introduces the reader to this promising approach for solving important classes of inverse problems. The wide applicability of this method is discussed by choosing typical examples, such as inverse scattering problems for the scalar Helmholtz equation, a

Oxford Lecture Series in Mathematics and Its Applications No. 36

December 2007 | 216 pages

978-0-19-921353-5, HARDBACK

£45.00/\$90.00/£39.50/\$80.00

Combinatorics, Complexity, and Chance

A Tribute to Dominic Welsh

Edited by **Geoffrey Grimmett**, University of Cambridge, and **Colin McDiarmid**, University of Oxford

This text provides a review of the consistent themes from Dominic Welsh's influential work in combinatorics and discrete probability. Original articles by key academics are set in a broader context by the inclusion of review material. The text will appeal to all those seeking an introduction to the relevant contemporary aspects of these fields.

Oxford Lecture Series in Mathematics and Its Applications No. 34

January 2007 | 320 pages

978-0-19-857127-8, HARDBACK

£39.50/\$74.50



Invitation to Fixed-Parameter Algorithms

Rolf Niedermeier, Universitaet Jena

'Niedermeier presents a wider range of concrete problems and problem variants, highlighting many algorithmic tricks and applications.'

Daniel Marx, *Mathematical Review*

An application-oriented introduction to the highly topical area of the development and analysis of efficient fixed-parameter algorithms for hard problems. Aimed at graduate and research mathematicians, algorithm designers, and computer scientists, it provides a fresh view on this highly innovative field of algorithmic research.

Oxford Lecture Series in Mathematics and Its Applications No. 31

2006 | 312 pages

978-0-19-856607-6, HARDBACK

£58.00/\$99.50



Graphs and Homomorphisms

Pavol Hell, Simon Fraser University, Burnaby, B.C., Canada, and **Jaroslav Nesetril**, Charles University, Prague, The Czech Republic

Based on the authors' lecture notes, this book is concerned with an aspect of graph theory that has broad applications to complexity theory, graph colourings, channel assignment and statistical physics. Containing exercises, hints and references, it is ideal for graduate students and researchers alike.

Oxford Lecture Series in Mathematics and Its Applications No. 28

2004 | 256 pages

978-0-19-852817-3, HARDBACK

£53.00/\$115.00

OXFORD LECTURE SERIES IN MATHEMATICS AND ITS APPLICATIONS

Introduction to the Mathematical Theory of Compressible Flow

Antonín Novotný, Laboratoire ANAM, Université de Toulon et du Var, France, and **Ivan Straskraba**, Mathematical Institute of the Academy of Sciences, Czech Republic

This book provides a rapid introduction to the mathematical theory of compressible flow, giving a comprehensive account of the field and all important results up to the present day. The book is written in a clear, instructive and self-contained manner and will be accessible to a wide audience.

Oxford Lecture Series in Mathematics and Its Applications No. 27

2004 | 528 pages

978-0-19-853084-8, HARDBACK

£67.00/\$124.50

The Diophantine Frobenius Problem

Jorge L. Ramírez Alfonsín, Maître de Conférences, Université Pierre et Marie Curie, Paris 6

'An invaluable addition to the mathematics discipline it represents a remarkable achievement. Studied with a huge list of helpful references.'

Current Engineering Practice

'This is a marvelous publication which will be eagerly sought after by mathematicians round the world.'

Current Engineering Practice

A number of methods, from several areas of mathematics, have been used in the hope of finding a formula giving the Frobenius number and algorithms to calculate it. The main intention of this book is to highlight such methods, ideas, viewpoints and applications to a broader audience.

Oxford Lecture Series in Mathematics and Its Applications No. 30

2005 | 264 pages

978-0-19-856820-9, HARDBACK

£61.00/\$114.50

Smoothing and Decay Estimates for Nonlinear Diffusion Equations

Equations of Porous Medium Type

Juan Luis Vázquez, Universidad Autónoma de Madrid

This text is concerned with quantitative aspects of the theory of nonlinear diffusion equations, which appear as mathematical models in different branches of Physics, Chemistry, Biology and Engineering.

Oxford Lecture Series in Mathematics and Its Applications No. 33

2006 | 248 pages

978-0-19-920297-3, HARDBACK

£45.00/\$89.50

Atmospheric Turbulence

A Molecular Dynamics Perspective

Adrian Tuck, National Oceanic & Atmospheric Administration, U.S. Department of Commerce

This book, authored by a well-known researcher and expositor in meteorology, focuses on the direct link between molecular dynamics and atmospheric variation. Uniting molecular dynamics, turbulence theory, fluid mechanics and non equilibrium statistical mechanics, it is relevant to the fields of applied mathematics, physics and atmospheric sciences, and focuses on fluid flow and turbulence, as well as on temperature, radiative transfer and chemistry.

January 2008 | 168 pages

978-0-19-923653-4, HARDBACK

£45.00/\$90.00

Theoretical Microfluidics

Henrik Bruus, Technical University of Denmark

The book treats microfluidics theory and its applications to lab-on-a-chip systems. It covers fluid dynamics and how to control flows and solutions in microsystems with various external fields. Containing a broad range of exercises, the text is developed for advanced

undergraduates, intending to enable the students to confront real problems.

Oxford Master Series in Physics No. 18

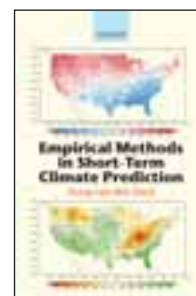
November 2007 | 336 pages

978-0-19-923509-4, PAPERBACK

£24.95/\$49.95

978-0-19-923508-7, HARDBACK

£49.95/\$99.95

Empirical Methods in Short-Term Climate Prediction

Huug van den Dool, Principal Scientist, CPC and Adjunct Professor, University of Maryland

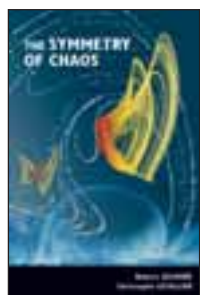
This clear, accessible text describes the methods and advances in short-term climate prediction at time scales of 2 weeks to a year. With an emphasis on the prediction methods themselves and the use

of observations, the text is ideal for students and researchers in Meteorology, Atmospheric Science, Geoscience, Mathematics, Statistics and Physics.

2006 | 240 pages | 12 plates

978-0-19-920278-2, HARDBACK

£52.00/\$89.95

The Symmetry of Chaos

Robert Gilmore, Drexel University, USA, and **Christophe Letellier**, Université de Rouen, France

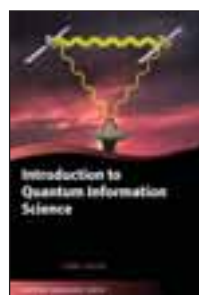
Why have scientists, engineers, and mathematicians become intrigued by chaos? Chaos is about predictability in even the most unstable systems, and symmetry is a pattern of predictability—a conceptual

tool to help understand complex behaviour. *The Symmetry of Chaos* treats this interplay between chaos and symmetry. This graduate textbook in physics, applied mathematics, engineering, fluid dynamics, and chemistry is full of exciting new material, illustrated by hundreds of figures. Nonlinear dynamics and chaos are relatively young fields, and in addition to serving textbook markets, there is a strong interest among researchers in new results in the field.

May 2007 | 566 pages

978-0-19-531065-8, HARDBACK

£48.00/\$79.50

Introduction to Quantum Information Science

Vlatko Vedral, University of Leeds, UK

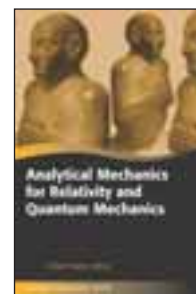
Making smaller and faster computers is one of the main goals of current technological progress, and is determined by the laws of physics. Quantum mechanics allows us to encode and manipulate information in ways much more efficient than with existing (classical) computers. The book is an introduction to this exciting subject.

Oxford Graduate Texts

September 2006 | 196 pages

978-0-19-921570-6, HARDBACK

£35.00/\$70.00

Analytical Mechanics for Relativity and Quantum Mechanics

Oliver Johns, Department of Physics, San Francisco State University

'The author deserves to be congratulated on the production of what soon will establish itself as a well-respected and useful book which I am pleased to have on my shelf. In short, it would be difficult to conceive of any initial course of

instruction and study on the subject of analytical mechanics for relatively and quantum mechanics which would not benefit from use of this well-planned and conceived and refreshing presentation.'

Current Engineering Practice. Volume 48 2005

Oxford Graduate Texts

July 2005 | 576 pages

978-0-19-856726-4, HARDBACK

£42.00/\$79.50

Turbulence

An Introduction for Scientists and Engineers

P. A. Davidson, Reader in Fluid Mechanics at the University of Cambridge

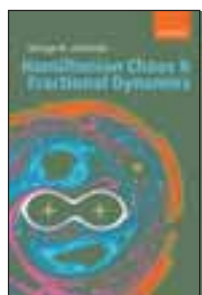
Based on a course by the author at the University of Cambridge, this comprehensive text on turbulence and fluid dynamics is aimed at year 4 undergraduates and graduates in applied mathematics, physics, and engineering, and provides an ideal reference for industry professionals and researchers. Containing many examples, the author combines the maximum of physical insight with the minimum of mathematical detail where possible. The text is highly illustrated throughout, and includes colour plates; required mathematical techniques are covered in extensive appendices.

2004 | 678 pages | 8 colour plates | numerous halftones and line drawings

978-0-19-852949-1, PAPERBACK £38.00/\$92.95
978-0-19-852948-4, HARDBACK £116.00/\$224.50

NEW IN PAPERBACK

Hamiltonian Chaos and Fractional Dynamics



George M. Zaslavsky, New York University, USA

'The strengths of the book lie in its broad survey of the complexity of Hamiltonian dynamics and its focus on interesting physical examples. The book has many excellent figures and illustrations as well as an extensive bibliography. Each chapter has a modest collection of associated exercises.'

William J. Satzer, *Zentralblatt Math*, Vol 1083

This book gives a realistic contemporary image of Hamiltonian dynamics, dealing with the basic principles of the Hamiltonian theory of chaos in addition to very recent and unusual applications of nonlinear dynamics and the fractality of dynamics.

April 2008 | 336 pages

978-0-19-953548-4, PAPERBACK £27.50/\$53.50
978-0-19-852604-9, HARDBACK £63.00/\$124.50

Singular Elliptic Problems

Bifurcation & Asymptotic Analysis

Marius Ghergu, Researcher, Institute of Mathematics, Romanian Academy, and **Vicentiu Radulescu**, Senior Researcher at the Institute of Mathematics, Romanian Academy, and Full Professor at the University of Craiova, Romania

This book provides a comprehensive introduction to the mathematical theory of nonlinear problems described by singular elliptic equations. There are carefully analyzed logistic type equations with boundary blow-up solutions and generalized Lane-Emden-Powder equations or Gierer-Meinhardt systems with singular nonlinearity in anisotropic media. These nonlinear problems appear as mathematical models in various branches of Physics, Mechanics, Genetics, Economics, Engineering, and they are also relevant in Quantum Physics and Differential Geometry.

One of the main purposes of this volume is to deduce decay rates for general classes of solutions in terms of estimates of particular problems. Much of the material included in this volume is devoted to the asymptotic analysis of solutions and to the qualitative study of related bifurcation problems. Numerical approximations illustrate many abstract results of this volume. A systematic description of the most relevant singular phenomena described in these lecture notes includes existence (or nonexistence) of solutions, unicity or multiplicity properties, bifurcation and asymptotic analysis, and optimal regularity.

The method of presentation should appeal to readers with different backgrounds in functional analysis and nonlinear partial differential equations. All chapters include detailed heuristic arguments providing thorough motivation of the study developed later on in the text, in relationship with concrete processes arising in applied sciences. The book includes an extensive bibliography and a rich index, thus allowing for quick orientation among the vast collection of literature on the mathematical theory of nonlinear singular phenomena.

June 2008 | 320 pages | OUP USA

978-0-19-533472-2, HARDBACK £44.00/\$80.00

Microstructure of Martensite

Why it forms and how it gives rise to the shape-memory effect



Kaushik Bhattacharya, California Institute of Technology, USA

The science of materials (metallurgy) tells us that every material contains microscopic features that vary at different length scales. This underlying microstructure determines the mechanical properties of the material. This book

presents the particularly dramatic and compelling case of shape-memory alloys, technologically important materials, beautifully explaining the link between microstructure and macroscopic properties. A sample wire of shape memory material is included with the book.

Oxford Series on Materials Modelling No. 2

November 2003 | 304 pages

978-0-19-850934-9, HARDBACK £52.50/\$99.50

Computer Simulations of Dislocations



Vasily Bulatov, Lawrence Livermore National Laboratory, and **Wei Cai**, Stanford University, USA

The book presents a variety of methods for computer simulations of crystal defects in the form of 'numerical recipes', complete with computer codes and analysis tools. By working through numerous case studies and

problems, this book provides a useful starter kit for further method development in the computational materials sciences.

Oxford Series on Materials Modelling No. 3

November 2006 | 304 pages

978-0-19-852614-8, HARDBACK £42.50/\$79.50

Milestones in Matrix Computation

The Selected Works of Gene H. Golub with Commentaries



Edited by **Raymond Chan**, The Chinese University of Hong Kong, **Chen Greif**, The University of British Columbia, and **Dianne O'Leary**, University of Maryland

The text presents and discusses some of the most influential papers in Matrix Computation authored by Gene H. Golub, one of the

founding fathers of the field. Including commentaries by leading experts and a brief biography, this text will be of great interest to students and researchers in numerical analysis and scientific computation.

February 2007 | 584 pages

978-0-19-920681-0, HARDBACK £65.00/\$130.00



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