

Mécanique des fluides, acoustique

Objektyp: **Chapter**

Zeitschrift: **L'Enseignement Mathématique**

Band (Jahr): **47 (2001)**

Heft 1-2: **L'ENSEIGNEMENT MATHÉMATIQUE**

PDF erstellt am: **24.09.2024**

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examines such powerful tools as 2-D and 3-D animation of geometrical images, transformations, shadows, and colors, and then further studies more complex problems in differential geometry. Well-illustrated with more than 350 figures — reproducible using the Maple programs in the book — the work is devoted to three main areas: curves, surfaces, and polyhedra. Pedagogical benefits can be found in the large number of Maple programs, some of which are analogous to C++ programs, including those for splines and fractals. To avoid tedious typing, readers will be able to download many of the programs from the Birkhäuser web site.

Guillermo SAPIRO. — **Geometric partial differential equations and image analysis.** — Un vol. relié, 16×23,5, de xxv, 384 p. — ISBN 0-521-79075-1. — Prix: £40.00. — Cambridge University Press, Cambridge, 2001.

This book provides an introduction to the use of geometric partial differential equations in image processing and computer vision. This research area brings a number of new concepts into the field, providing a very fundamental and formal approach to image processing. State-of-the-art practical results in a large number of real problems are achieved with the techniques described in this book. Applications covered include image segmentation, shape analysis, image enhancement, and tracking. This book will be a useful resource for researchers and practitioners. It is intended to provide information for people investigating new solutions to image processing problems as well as for people searching for existing advanced solutions.

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G.K. BATCHELOR, H.K. MOFFATT, M.G. WORSTER, (Editors). — **Perspectives in fluid dynamics: a collective introduction to current research.** — Un vol. relié, de 18×25, de xii, 631 p. — ISBN 0-521-78061-6. — Prix: £100.00. — Cambridge University Press, Cambridge, 2000.

Conventional textbooks cannot hope to give graduate students more than an inkling of what topics are currently being researched, or how to make a choice between them. This book aims to rectify matters, at least in part. It consists of eleven chapters that each introduces a different branch of the subject. Though not exhaustive, the coverage is broad: thin-film flows, Saffman-Taylor fingering, flows in arteries and veins, convective and absolute instabilities, turbulence, natural convection, magnetohydrodynamics, solidification, geological fluid mechanics, oceanography and atmospheric dynamics are all introduced and reviewed by established authorities. Thus the book will not only be suitable for graduate-level courses but also for specialists seeking introductions to other areas.

Giovanni P. GALDI, John G. HEYWOOD, Rolf RANNACHER, (Editors). — **Fundamental directions in mathematical fluid mechanics.** — Advances in mathematical fluid mechanics. — Un vol. relié, 17,5×24, de viii, 293 p. — ISBN 3-7643-6414-9. — Prix: SFr. 118.00. — Birkhäuser, Basel, 2000.

This set of six papers, written by eminent experts in the field, is concerned with that part of fluid mechanics that seeks its foundation in the rigorous mathematical treatment of the Navier-Stokes equations. While some of the contributions are expository, others primarily present new results within a wider context and fuller exposition than is usual for research papers. The book is meant to introduce researchers and advanced students to the research level on some of the most important topics of the field.

Roy JACKSON. — **The dynamics of fluidized particles.** — Cambridge monographs on mechanics. — Un vol. relié, 16×23,5, de XII, 339 p. — ISBN 0-521-78122-1. — Prix: £42.50. — Cambridge University Press, Cambridge, 2000.

Recent years have seen major progress in the development of equations to describe the motion of fluid-particle mixtures and their application to a limited range of problems. With rapid advances in numerical methods and computing power we are now presented with new opportunities to use direct integration of these equations in the solution of complex practical problems. In this book the author formulates these equations carefully and fully describes the important existing applications that serve to test their ability to predict salient phenomena. This account will be of value to both novices and established researchers in the field, and also to people interested in applying the equations to practical engineering problems.

Ansgar JÜNGEL. — **Quasi-hydrodynamic semiconductor equations.** — Progress in nonlinear differential equations and their applications, vol. 41. — Un vol. relié, 16×24, de X, 293 p. — ISBN 3-7643-6349-5. — Prix: SFr. 148.00. — Birkhäuser, Basel, 2001.

In this book a hierarchy of macroscopic models for semiconductor devices is presented. Three classes of models are studied in detail: isentropic drift-diffusion equations, energy-transport models, and quantum hydrodynamic equations. The derivation of each of the models is shown, including physical discussions. Furthermore, the corresponding mathematical problems are analyzed, using modern techniques for nonlinear partial differential equations. The equations are discretized employing mixed finite-element methods. Also, numerical simulations for modern semiconductor devices are performed, showing the particular features of the models. Modern analytical techniques have been used and further developed, such as positive solution methods, local energy methods for free-boundary problems and entropy methods.

Economie, recherche opérationnelle, jeux

Claus HILLERMEIER. — **Nonlinear multiobjective optimization: a generalized homotopy approach.** — International series of numerical mathematics, vol. 135. — Un vol. relié, 17×24, de 135 p. — ISBN 3-7643-6498-X. — Prix: SFr. 78.00. — Birkhäuser, Basel, 2001.

The present work, after providing a survey of the state of the art in multiobjective optimization, gives new insight into this important mathematical field by consequently taking up the viewpoint of differential geometry. This approach, unprecedented in the literature, very naturally results in a generalized homotopy method for multiobjective optimization which is theoretically well-founded and numerically efficient. The power of the new method is demonstrated by solving two real-life problems of industrial optimization. The book presents recent results obtained by the author.

Mahmut PARLAR. — **Interactive operations research with Maple: methods and models.** — Un vol. relié, 16×24, de XIV, 468 p. — ISBN 0-8176-4165-3. — Prix: SFr. 108.00. — Birkhäuser, Boston, 2000.

Detailed is Maple's treatment of some of the mathematical techniques used in OR modeling: e.g., algebra and calculus, ordinary and partial differential equations, linear algebra, transform methods, and probability theory. A number of examples of OR techniques and applications are presented, such as linear and nonlinear programming, dynamic programming, stochastic processes, inventory models, queuing systems, and simulation. Throughout the text Maple statements used in the solutions of problems are clearly explained. At the same time, technical background material is presented in a rigorous mathematical manner to reach the OR novice and