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Kapitel: Informatique

Prem K. KYTHE. — **Computational conformal mapping.** — Un vol. relié, 16,5×24, de XIV, 462 p. — ISBN 0-8176-3996-9. — Prix: SFr. 128.00. — Birkhäuser, Boston, 1998.

This book provides a self-contained and systematic introduction to the theory and computation of conformal mappings of simply- or multiply- connected regions onto the unit disk or canonical regions. It provides a comprehensive and systematic coverage of the concepts and related numerical analysis with applications to different areas in applied math, physics and engineering. The style and presentation are readily accessible to graduates and researchers.

Alfio QUARTERONI, Alberto VALLI. — **Domain decomposition methods for partial differential equations.** — Numerical mathematics and scientific computation. — Un vol. relié, 16×24, de XV, 360 p. — ISBN 0-19-850178-1. — Prix: £55.00. — Clarendon Press, Oxford, 1999.

Domain decomposition methods are designed to allow the effective numerical solution of partial differential equations on parallel computer architectures. They comprise a relatively new field of study, but have already found applications in many branches of physics and engineering. In this book the authors illustrate the basic mathematical concepts behind domain decomposition, looking at a large variety of boundary value problems. Contents include: symmetric elliptic equations; advection-diffusion equations; the elasticity problem; the Stokes problem for incompressible and compressible fluids; the time-harmonic Maxwell equations; parabolic and hyperbolic equations; and suitable couplings of heterogeneous equations.

J.A. SETHIAN. — **Level set methods and fast marching methods: evolving interfaces in computational geometry, fluid mechanics, computer vision, and material science.** — Cambridge monographs on applied and computational mathematics, vol. 3. — Un vol. broché, 15×23, de XX, 378 p. — ISBN 0-521-64557-3. — Prix: £18.95. — Cambridge University Press, Cambridge, 1999.

The book begins with an introduction to the dynamics of moving curves and surfaces. Next, efficient computational techniques for approximating viscosity solutions to partial differential equations are developed, using the numerical technology from hyperbolic conservation laws. A large collection of applications are given, including examples from physics, chemistry, fluid mechanics, combustion, image processing, material science, fabrication of microelectronic components, computer vision, computer-aided design, and optimal control theory.

Informatique

Michael TROTT. — **Graphica 1: The imaginary made real: the art of Michael Trott.** — Un vol. relié, 26×26, de XIII, 89 p. — ISBN 1-57955-009-6. — Prix: US$34.95. — Wolfram Media, Champaign, IL, 1999.

Two worlds merge in this volume of breathtaking *Mathematica*-generated images. With an artist's eye and a mathematician's tools, Michael Trott has produced a collection of dazzling, surprising images, ranging from the playful to the enthralling. He uses a palette of new tools and techniques to create a mesmerizing new kind of art form, residing in the strange middle ground between the artificial and the natural. Some images are playful geometric explorations; others are directly inspired by the work of such artists as Escher and Vasarely; still others make use of sophisticated mathematical methods borrowed from sciences such as electrodynamics and solid state physics.

Igor BAKSHEE. — **Graphica 2: The pattern of beauty: the art of Igor Bakshee.** — Un vol. relié, 26×26, de XII, 86 p. — ISBN 1-57955-010-X. — Prix: US$34.95. — Wolfram Media, Champaign, IL, 1999.

The remarkable images in this volume dwell on the border between order and chaos. In each one, the artist and physicist Igor Bakshee balances strict geometry against carefully controlled randomness, producing a unique computer-generated design. By mixing the opposing forces of order and disorder in just the right proportion, Bakshee's mathematical alchemy brings the images to life.

Ke CHEN, Peter GIBLIN, Alan IRVING. — **Mathematical explorations with MATLAB.** — Un vol. broché, 15×22,5, de XIV, 306 p. — ISBN 0-521-63920-4. — Prix: £15.95. — Cambridge University Press, Cambridge, 1999.

The emphasis is on understanding and investigating the mathematics usually encountered in first year university courses, and putting it into practice in a wide variety of modelling situations. In the process, the reader will gain some fluency with MATLAB, no starting knowledge of the package being assumed. The range of material is wide: matrices, whole numbers, complex numbers, geometry of curves and families of lines, data analysis, random numbers and simulations, and differential equations form the basic mathematics. All extras to the standard MATLAB package are supplied on the World Wide Web.

Claude GOMEZ, Carey BUNKS, Jean-Philippe CHANCELIER, François DELEBECQUE, Maurice GOURSAT, Ramine NIKOUKHAH, Serge STEER, (Editors). — **Engineering and scientific computing with Scilab.** — Un vol. relié, 18,5×26, de XXIII, 491 p. + 1 CD-ROM. — ISBN 0-8176-4009-6. — Prix: SFr. 138.00. — Birkhäuser, Boston, 1999.

Scilab is a powerful, open computing environment designed for engineering and scientific applications. The first part includes an introductory description of Scilab's programming language, syntax, useful functions, and graphics. Also described is how users can extend the functionality of Scilab by integrating custom Fortran and C programs as new Scilab primitives. Finally, the creation of abstract data types is discussed as well as the use of operators for these new data types. The second part of the book discusses topics of signal processing, nonlinear simulation (including hybrid system builder) and optimization, classical and robust control, mixed symbolic/numeric computations, and graph/network manipulation. Finally, a specific real life industrial menu-driven application is presented. The book comes with a CD-ROM containing the entire source code of Scilab as well as binary executables for a variety of operating systems. This CD-ROM also contains Scilab programs illustrating many of the examples in the book.

Stephan KAUFMANN. — **A crash course in *Mathematica*.** — Un vol. broché, 17×24, de 200 p + 1 CD-ROM. — ISBN 3-7643-6127-1. — Prix: SFr. 42.00. — Birkhäuser, Basel, 1999.

This book is a compact introduction to the program *Mathematica,* which is widely used in mathematics, as well as in the natural and engineering sciences. The essential basics of *Mathematica* Versions 3 and 4 (front end, kernel and the most important standard packages) are explained with simple, non-field-specific examples and exercises. After working through the book, readers will be able to solve problems from their own specialties by themselves and find additional support in the online documentation. The included CD-ROM contains the entire book in the form of *Mathematica* notebooks, with color versions of the graphics and animations. Hyperlinks built into the notebooks serve as internal references and point to the program's online documentation and to resources on the Internet. The Win95/98/NT-, Mac- and Unix-compatible CD-ROM contains the program *MathReader*, with which the notebooks can be viewed without a complete installation of *Mathematica.*

Lionel PORCHERON. — **Maple : cours et applications : 1ère et 2e années toutes filières.** — Collection J'intègre. — Préface de Jean-Michel Ferrard. — Un vol. broché, 17×24, de XVIII, 340 p. — ISBN 2-10-004321-3. — Prix: FF 140.00. — Dunod, Paris, 1999, diffusé en Suisse par Havas Services Suisse, Fribourg.

Il s'agit d'un cours d'utilisation du logiciel Maple, qui intègre des applications en mathématiques, physique et chimie, ces deux derniers domaines n'étant que peu présents dans les ouvrages actuels. Le but de l'auteur est de réaliser une présentation aussi complète que possible de ce logiciel, et de permettre ainsi aux étudiants d'acquérir les bases essentielles requises pour une utilisation optimale de Maple. Très pédagogique, cet ouvrage a été spécialement étudié pour correspondre aux besoins immédiats d'un élève de classes préparatoires. *Sommaire:* Présentation. Les objets Maple. Analyse. Algèbre linéaire. Affectation, évaluation, simplification. Structures Maple. Résolution d'équations. Le graphisme. La programmation. Applications. Annexes. Bibliographie. Index.

Mécanique des fluides, acoustique

Grzegorz ŁUKASZEWICZ. — **Micropolar fluids: theory and applications.** — Modeling and simulation in science, engineering and technology. — Un vol. relié, 16×24, de XV, 253 p. — ISBN 0-8176-4008-8. — Prix: SFr. 128.00. — Birkhäuser, Boston, 1999.

The goal of this book is to provide a comprehensive exposition of the principles and methods of micropolar fluids for a broad readership in the science and engineering of fluid mechanics. The book is organized into three parts. The first presenting the basic model of micropolar fluids, with necessary background information. The second development presents the analysis of the mathematics of motion in micropolar fluids with many detailed examples. The third part presents some select and important applications in the topics of lubrication theory and porous media.

Rita MEYER-SPASCHE. — **Pattern formation in viscous flows: the Taylor-Couette problem and Rayleigh-Bénard convection.** — International series of numerical mathematics, vol. 128. — Un vol. relié, 17,5×24, de XI, 209 p. — ISBN 3-7643-6047-X. — Prix: SFr. 98.00. — Birkhäuser, Basel, 1999.

Topics and questions addressed are: Mathematical modeling. Numerical modeling. What kinds of flow patterns do the equations allow in the nonlinear regime? How many solutions exist for given values of the control parameters? Are they stable? How do spatial patterns and the number of solutions vary with the parameters? For some parameter values many more solutions were found than previously expected (up to 21), in other parameter regimes not even those solutions could be found whose existence had been taken for granted. These «experimental» numerical results led to conjectures on the global structure of secondary bifurcations in the Taylor system and thus to possible explanations for existence and non-existence of solutions.

Lev A. OSTROVSKY, Alexander S. POTAPOV. — **Modulated waves: theory and applications.** — Johns Hopkins studies in the mathematical sciences. — Un vol. relié, 16×23,5, de XV, 369 p. — ISBN 0-8018-5870-4. — Prix: US$72.00. — The Johns Hopkins University Press, Baltimore, 1999.

The book may be divided into three parts: the first one (Chapters 1-4) contains general information about waves, their kinematic and dynamic properties, energy and momentum, and variational methods in wave theory. The second part (Chapters 5-8) is devoted to linear modulated