Informatique

P.G. CIARLET, J.L. LIONS, (Editors). — **Handbook of numerical analysis, vol. 7: Solution of equations in R^n (part 3). Techniques of scientific computing (part 3).** — Un vol. relié, 17,5×24,5, de X, 1020 p. — ISBN 0-444-50350-1. — Prix: Dfl. 350.00. — Elsevier, Amsterdam, 2000.

This series of volumes covers all the major aspects of Numerical Analysis, serving as the basic reference work on the subject. Each volume concentrates on one to three particular topics. Each article, written by an expert, is an in-depth survey, reflecting the most recent trends in the field, and is essentially self-contained. *Contents:* Gaussian elimination for the solution of linear systems of equations by G. Meurant. — The analysis of multigrid methods by J.H. Bramble and X. Zhang. — Wavelet methods in numerical analysis by A. Cohen. — Finite volume methods by R. Eymard, T. Gallouët and R. Herbin.

Franck JEDRZEJEWSKI. — **Introduction aux méthodes numériques.** — Un vol. broché, 15×23,5, de 269 p. — ISBN 2-287-59711-5. — Prix: DM 79.00. — Springer, Paris, 2001.

L'originalité de ce livre est de réunir en un seul volume l'ensemble des techniques numériques enseignées dans les Grandes Ecoles et certaines formations universitaires. Il présente sur de nombreux exemples le déroulement séquentiel des algorithmes et est, par conséquent, d'une lecture facile. Les concepts premiers du calcul numérique, les notions de stabilité, de convergence et d'optimisation algorithmiques sont introduits dès les premiers chapitres. Les méthodes d'approximation et les techniques d'analyse numérique matricielle, qui forment les chapitres suivants, sont accompagnées d'exemples et d'exercices qui permettent une meilleure compréhension du texte. L'étude des équations différentielles ordinaires introduit plusieurs concepts mathématiques importants. Les derniers chapitres sont consacrés aux équations aux dérivées partielles et aux méthodes d'éléments finis. Ils traitent de la résolution numérique des équations linéaires et non-linéaires de mécanique et de physique mathématique, qui demeurent les problèmes qui préoccupent le plus les ingénieurs d'aujourd'hui.

Alexander A. SAMARSKII. — **The theory of difference schemes**. — Monographs and textbooks in pure and applied mathematics, vol. 240. — Un vol. relié, 16×23,5 de XVII, 761 p. — ISBN 0-8247-0468-1. — Prix: US$225.00. — Marcel Dekker, New York, 2001.

Illustrated with helpful examples of practical implementations of general stability theory for improving accuracy, the book summarizes basic concepts such as approximation, stability, convergence, and operator equations... demonstrates applications of a priori estimates for establishing convergence and expressing stability of two- and three-layer schemes with initial data... describes homogeneous difference schemes in the class of discontinuous coefficients... covers a variety of elliptic equations, including the Dirichlet problem and Poisson's equations... treats difference schemes as operator and operator-difference equations without structural constraints and as nonstationary equations with constant coefficients... and much more.

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Gerald FARIN, Dianne HANSFORD. — **The essentials of CAGD.** — Un vol. relié, 19×24,5, de XII, 229 p. — ISBN 1-56881-123-3. — Prix: US$48.00. — A.K. Peters, Natick, Mass., 2000.

Putting the G into CAGD, the authors provide a much-needed practical and basic introduction to computer-aided geometric design. This book will help readers understand and use the elements of computer-aided geometric design, curves and surfaces, without the mathematical baggage that is necessary only for more advanced work. Though only minimal background in mathematics is needed to understand the book's concepts, the book covers an amazing array of

topics such as Bézier and B-spline curves and their corresponding surfaces, subdivision surfaces, and NURBS (Non-Uniform Rational B-Splines). Also included are techniques such as interpolation and least squares methods.

Gil KALAI, Günter M. ZIEGLER, (Editors). — **Polytopes: combinatorics and computation.** — DMV Seminar, Bd. 29. — Un vol. broché, 17×24, de 232 p. — ISBN 3-7643-6351-7. — Prix: SFr. 48.00. — Birkhäuser, Basel, 2000.

Questions that arose from linear programming and combinatorial optimization have been a driving force for modern polytope theory, such as the diameter questions motivated by the desire to understand the complexity of the simplex algorithm, or the need to study facets for use in cutting plane procedures. In addition, algorithms now provide the means to computationally study polytopes, to compute their parameters such as flag vectors, graphs and volumes, and to construct examples of large complexity. The papers of this volume thus display a wide panorama of connections of polytope theory with other fields. Areas such as discrete and computational geometry, linear and combinatorial optimization, and scientific computing have contributed a combination of questions, ideas, results, algorithms and, finally, computer programs. The volume grew out of a DMV Seminar on "Polytopes and Optimization", held in Oberwolfach in November 1997, and represents lectures and presentations from that workshop as well as additional invited papers.

Manfred KERBER, Michael KOHLHASE, (Editors). — **Symbolic computation and automated reasoning: the Calculemus-2000 Symposium.** — Un vol. relié, 16×24, de XI, 270 p. — ISBN 1-56881-145-4. — Prix: US$60.00. — A.K. Peters, Natick, Mass., 2001.

Computer algebra and automated reasoning systems are two powerful tools that support complex tasks such as the design of large software and hardware systems. Inspired by the ideas of Gottfried Wilhelm Leibnitz, one of the first inventors of mechanical calculators, whose dictum "calculemus" expressed his dream of establishing an algorithm that would resolve any disputes by objective reasoning, the Calculemus 2000 Symposium was organized with the goal to further integrate these tools in optimizing the handling of complex tasks. This volume presents the papers given at the 8th Symposium on the Integration of Symbolic Computation and Mechanized Reasoning, held August 6-7, 2000 in St. Andrews, Scotland.

Donald E. KNUTH. — **Arithmetik.** — Aus dem Englischen übersetzt von Rüdiger Loos. — Un vol. relié, XIII, 538 p. — ISBN 3-540-66745-8. — Prix: DM 69.00. — Springer, Berlin, 2001.

Das Buch *Arithmetik* ist eine Übersetzung des vierten Kapitels der legendären Werkreihe *The Art of Computer Programming* von Donald E. Knuth in der neuesten Fassung. Es handelt sich um eine umfangreiche Einführung in die Computeralgebra, die den neuesten Stand der Forschung berücksichtigt. Donald E. Knuth versteht es, die Algorithmen didaktisch sehr geschickt und ohne Kompromisse bei der Strenge aufzubereiten. Das Buch enthält außerdem Hunderte von Aufgaben verschiedener Schwierigkeitsgrade mit Lösungen. Der Übersetzer, Prof. Dr. R. Loos, lehrt an der Universität Tübingen. — Inhalt: Arithmetische Algorithmen. — Arithmetik von Ganzzahlen. — Arithmetik von Gleitpunktzahlen. — Polynominale Arithmetik. — Potenzreihen.

Vladimir ROVENSKI. — **Geometry of curves and surfaces with Maple.** — Un vol. relié, 18 ×26, de X, 310 p. — ISBN 3-8176-4074-6. — Prix: SFr. 98.00. — Birkhäuser, Boston, 2000.

This concise text on geometry with computer modeling presents some elementary methods for analytical modeling and visualization of curves and surfaces. The author systematically

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.

Mécanique des fluides, acoustique

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.