

Informatique

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designing splines for the interpolation of points in the plane by curves, and the interpolation of points in 3-space by surfaces. These splines include various estimated-tangent Hermite splines and double-tangent splines, as well as classical natural splines and geometrically-continuous splines such as beta-splines and nu-splines. A variety of special topics are covered, including monotonic splines, optimal smoothing splines, basis representations, and exact energy-minimizing physical splines. An in-depth review of differential geometry of curves and broad range of exercises, with selected solutions, and complete computer programs for several forms of splines and smoothing splines, make this book useful for a broad audience.

Alfio QUARTERONI, Riccardo SACCO, Fausto SALERI. — **Numerical mathematics.** — Texts in applied mathematics, vol. 37. — Un vol. relié, 16×24, de xx, 654 p. — ISBN 0-387-98959-5. — Prix : DM 98.00. — Springer, Berlin, 2000.

One of the purposes of this book is to provide the mathematical foundations of numerical methods, to analyze their basic theoretical properties (stability, accuracy, and computational complexity) and to demonstrate their performances on examples and counterexamples, which outline their pros and cons. This is done using the MATLAB™ software environment, which is user-friendly and widely adopted. Within any specific class of problems, the most appropriate scientific computing algorithms are reviewed, their theoretical analysis is carried out, and the expected results are verified on a MATLAB™ computer implementation. Every chapter is supplied with examples, exercises, and applications of the discussed theory to the solution of real-life problems.

Alfio QUARTERONI, — **Méthodes numériques pour le calcul scientifique : programmes en MATLAB.** — Collection Iris. — Un vol. broché, 15,5×23,5, de xi, 444p. — ISBN 2-287-59701-8. — Prix : DM 98.00. — Springer, Paris, 2000.

Cet ouvrage présente les méthodes fondamentales du calcul scientifique. Il a pour objectif d'aborder à la fois des aspects théoriques et pratiques. On y trouvera donc aussi bien les propriétés de stabilité, convergence et complexité des méthodes que les questions relatives à leur implémentation. De nombreux programmes, proposés en MATLAB (les sources de ces programmes sont également disponibles sur internet à l'adresse <http://www1.mate.polimi.it/calnum/programs.html>), permettent au lecteur de tester immédiatement les algorithmes étudiés. De plus, diverses applications à des problèmes issus de la physique et des sciences de l'ingénieur illustrent l'utilisation des méthodes numériques dans des cas concrets.

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Peter BÜRGISSER. — **Completeness and reduction in algebraic complexity theory.** — Algorithms and computation in mathematics, vol.7. — Un vol. relié, 16×24, de xii, 168 p. — ISBN 3-540-66752-0. — Prix : DM 129.00. — Springer, Berlin, 2000.

The theory of NP-completeness is a cornerstone of computational complexity. This monograph provides a thorough and comprehensive treatment of this concept in the framework of algebraic complexity theory. Many of the results presented are new and published for the first time. Topics include: complete treatment of Valiant's algebraic theory of NP-completeness, interrelations with the classical theory as well as the Blum-Shub-Smale model of computation, questions of structural complexity, fast evaluation of representations of general linear groups, and complexity of immanants. The book can be used at the advanced undergraduate or at the beginning graduate level in either mathematics or computer science.

Kevin R. COOMBES, Brian R. HUNT, Ronald L. LIPSMAN, John E. OSBORN, Garrett J. STUCK. — **Mathematica: cours et applications, 1^{re} et 2^e années toutes filières.** — J'intègre, cours. — Un vol. 17×24, de XIII, 189 p. — ISBN 2-10-004778-7. — Prix: FF 135.00. — Dunod, Paris, 2000, diffusé en Suisse par Havas Services Suisse, Fribourg.

Mathematica, le célèbre logiciel de calcul formel, peut tracer des courbes représentatives de fonctions, résoudre des équations, procéder à des études statistiques. Il sait aussi mettre en page et possède un éditeur de texte capable de combiner des calculs mathématiques avec du texte et des graphes pour créer un document complet. Ce document peut même être mis à disposition sur Internet. On trouvera dans ce livre, un cours explicite et illustré, des exercices corrigés d'algèbre et d'analyse pour s'entraîner, un chapitre consacré aux applications concrètes du logiciel en mathématiques, physique, chimie, et cryptographie, un glossaire complet répertoriant commandes, options, fonctions, constantes prédéfinies et packages.

Alain DARTE, Yves ROBERT, Frédéric VIVIEN. — **Scheduling and automatic parallelization.** — Un vol. relié, 18×26, de XVI, 261 p. — ISBN 0-8176-4149-1. — Prix: SFr. 128.00. — Birkhäuser, Boston, 2000.

A new state-of-the-art text which addresses the study of compiler transformations for parallel aspects of sophisticated scheduling problems, task-graph scheduling and loop-nest scheduling. The presentation is self-contained and complete with detailed code for algorithms, proofs and selected exercise sets. The book is essential reading for advanced graduates, postgraduates and professionals in computer science and software engineering who are studying automatic parallelization techniques, program transformations and optimization criteria.

George GRÄTZER. — **Math into LaTeX.** — 3rd edition. — Un vol. broché, 19×24, de XXXVIII, 584 p. — ISBN 0-8176-4131-9. — Prix: SFr. 88.00. — Birkhäuser, Boston co-published by Springer, New York, 2000.

Math into LaTeX is for the mathematician, physicist, engineer, scientist, or technical typist who needs to learn quickly how to write and typeset articles and books containing mathematical formulas, and requires a thorough reference book on all aspects of LaTeX and the AMS packages, the enhancements to LaTeX by the American Mathematical Society. Key features of *Math into LaTeX*: a simple, example-based, visual approach; a quick introduction (Part I) allowing readers to type their first articles in only a few hours; sample articles to demonstrate the basic structure of LaTeX and AMS articles; useful appendices containing mathematical and text symbol tables and information on how to convert to standard LaTeX from older versions of LaTeX and AMS-LaTeX. New features of the 3rd edition include: coverage of AMS packages, version 2.0; a new chapter on writing books in LaTeX; a new part, *Math and the Web* covers where to find useful LaTeX-related information on the Internet and how to publish LaTeX documents on the Web.

Jürgen RICHTER-GEBERT, Ulrich H. KORTENKAMP. — **User manual for the interactive geometry software Cinderella.** — Un vol. broché, 15,5×23,5, de x, 143 p. — ISBN 3-540-67139-0. — Prix: DM 39.00. — Springer, Berlin, 2000.

Cinderella is a program for doing geometry on a computer. In its present form it is the product of a sequel of three projects done between 1993 and 1998. It is based on various mathematical theories ranging from the great discoveries of the geometers in the nineteenth century to newly developed methods that find their first applications in this program. The authors want to point out the major features of this software: *Cinderella* is a mouse-driven interactive geometry

program... has built-in automatic proving facilities... allows simultaneous manipulation and construction in different views... has “native support” for non-euclidean geometries... has advanced facilities for geometric loci... is “internet-aware” (written in Java)... produces high-quality printouts... is based on mathematical logic.

Mécanique des particules et systèmes

Nicola BELLOMO, Luigi PREZIOSI, Antonio ROMANO. — **Mechanics and dynamical systems with *Mathematica*[®]**. — Modeling and simulation in science, engineering and technology. — Un vol. relié, 16 × 24, de XIII, 417 p. — ISBN 0-8176-4007-X. — Prix: SFr. 128.00. — Birkhäuser, Boston, 2000.

This book provides a systematic and unified treatment of mechanics and dynamical systems, addressing modeling, qualitative analysis, and simulations of physical systems using ordinary differential equations. The scientific computational components are presented using the software program *Mathematica*, both in worked examples and in the end-of-chapter problems. Special attention is given to classical mechanics models in light of new computational methods and concepts from dynamical systems. The book's nine chapters are organized into three unified parts: mathematical methods for differential equations; methods of classical mechanics; and dynamics, stochastic models, and discretization of continuous models.

Mécanique des solides, élasticité et plasticité

Teodor M. ATANACKOVIC, Ardéshir GURAN. — **Theory of elasticity for scientists and engineers**. — Un vol. relié, 16 × 24, de XII, 374 p. — ISBN 3-8176-4072-X. — Prix: SFr. 128.00. — Birkhäuser, Boston, 2000.

This new book treats classical elasticity theory from a modern point of view. It is intended as a general introduction to the various branches of elasticity theory and its applications. In the first part of the book, the theory of stress and strain is treated in a standard way. The important feature here is that the nonlinear stress tensor is the basis from which the linearized version is obtained. Next, the standard derivation of the Hooke's law for isotropic elastic and the Duhamel-Neumann law for thermoelastic body is presented. After that various generalizations of the Hooke's law for one-dimensional case are given. The three-dimensional generalizations of the Hooke's law are also discussed and the influence of geometric non-linearity on finite deformations in a linear state of stress is examined. The book contains solutions to numerous problems in two and three dimensions.

Mécanique des fluides, acoustique

Carlo CERCIGNANI. — **Rarefied gas dynamics: from basic concepts to actual calculations**. — Cambridge texts in applied mathematics. — Un vol. broché, 15 × 23, de XVIII, 320 p. — ISBN 0-521-65992-2. — Prix: £18.95 (relié: £50.00). — Cambridge University Press, Cambridge, 2000.

The aim of this book is to present the concepts, methods, and applications of kinetic theory to rarefied gas dynamics. After introducing the basic tools, problems in plane geometry are treated using approximation techniques (perturbation and numerical methods). These same techniques are later used to deal with two- and three-dimensional problems. The models include not only monatomic but also polyatomic gases, mixtures, and chemical reactions. A special chapter is devoted to evaporation and condensation phenomena.