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Kapitel: Analyse numérique

honored stats, introduce some new measures of performance, and delve into the all-important role of chance in the game. Whether they're analyzing Barry Bonds or the extraordinary drama of the 2002 World Series, they show us how statistics can enhance not just our understanding, but our appreciation of the game.

Analyse numérique

Heinrich FREISTÜHLER, Gerald WARNECKE, (Editors). — **Hyperbolic problems: theory, numerics, applications: Eighth International Conference in Magdeburg, February/March 2000**. — International series of numerical mathematics, vol. 140 et 141. — Deux vol. reliés, 17×24, de 972 p. au total. — ISBN 3-7643-6709-1 et 3-7643-6710-5. — Prix: l'ensemble des volumes, SFr. 198.00. — Birkhäuser, Basel, 2003.

Hyperbolic partial differential equations describe phenomena of material or wave transport in physics, biology and engineering, especially in the field of fluid mechanics. The mathematical theory of hyperbolic equations has recently made considerable progress. Accurate and efficient numerical schemes for computation have been and are being further developed. This two-volume set of conference proceedings contains about 100 refereed and carefully selected papers. The books are intended for researchers and graduate students in mathematics, science and engineering interested in the most recent results in theory and practice of hyperbolic problems. Applications touched in these proceedings concern one-phase and multiphase fluid flow, phase transitions, shallow water dynamics, elasticity, extended thermodynamics, electromagnetism, classical and relativistic magnetohydrodynamics, cosmology. Contributions to the abstract theory of hyperbolic systems deal with viscous and relaxation approximations, front tracking and wellposedness, stability of shock profiles and multi-shock patterns, traveling fronts for transport equations. Numerically oriented articles study finite difference, finite volume, and finite element schemes, adaptive, multiresolution, and artificial dissipation methods.

R. GLOWINSKI, (Author), P.G. CIARLET, J.L. LIONS, (Editors). — **Handbook of numerical analysis, vol. 9: Numerical methods for fluids (part 3).**— Un vol. relié, 17×25, de x, 1176 p. — ISBN 0-444-51224-1. — Prix: € 190.00. — Elsevier, Amsterdam, 2003.

This book is dedicated to the numerical simulation of unsteady incompressible viscous flow modelled by the Navier-Stokes equations, or by non-Newtonian variants of them. In order to achieve this goal, the author has developed a methodology based on the following tools: (1) Time discretization by operator splitting schemes such as Peaceman-Rachford's, Douglas-Rachford's, Marchuk-Yanenko's, Strang's symmetrized, and the so-called theta–scheme introduced by the author in the mid-eighties. (2) Projection methods (in L2 or H1) for the treatment of the incompressibility condition div $\mathbf{u} = 0$. (3) Treatment of the advection by either a centered scheme leading to linear or nonlinear advection-diffusion problems solved by least squares/conjugate gradient algorithms, or to a linear wave-like equation well suited to finite element based solution methods. (4) Space approximation by finite element methods such as Hood-Taylor and Bercovier-Pironneau, which are relatively easy to implement. In addition to the above topics the text contains detailed discussions of conjugate gradient algorithms, least-squares methods for boundary value problems which are not equivalent to problems of the calculus of variations, Uzawa-type algorithms for the solution of saddle-point problems, embedding/fictitious domain methods for the solution of elliptic and parabolic problems. In fact many computational methods discussed apply also to non-CFD problems although they were mostly designed for the solution of flow problems.

Claude LE BRIS, (Editor). — **Handbook of numerical analysis, Vol. 10: Special volume: Computational chemistry.** — Un vol. broché, 17×25, de XVI, 899 p. — ISBN 0-444-51248-9. — Prix: € 170.00. — Elsevier, Amsterdam, 2003.

The book aims to provide the reader with a general overview of the mathematical and numerical techniques used for the simulation of matter at the microscopic scale. The emphasis lays upon the numerics, but modelling aspects are also addressed. The contributors come from different scientific communities: physics, theoretical chemistry, mathematical analysis, stochastic analysis, numerical analysis. The first four contributions aim at introducing the field. They present the basics that will be used throughout the volume. The second part of the volume consists of contributions focusing on special techniques and/or applications. The volume ends with contributions, by outstanding researchers of the field, on the control of chemical reactions, in the sense "laser control of the evolution of quantum systems", one of the major and the most promising fields of applications related to theoretical chemistry.

Informatique

L. F. SHAMPINE, I. GLADWELL, S. THOMPSON. — **Solving ODEs with Matlab** — Un vol. broché, 20×23, de VIII, 263 p. — ISBN 0-521-53094-6. — Prix: £21.95. — Cambridge University Press, Cambridge, 2003.

This concise text for a one-semester course for upper-level undergraduates and beginning graduate students in engineering, science, and mathematics can also serve as a quick reference for professionals. The major topics in ordinary differential equations, initial value problems, boundary value problems, and delay differential equations, are usually taught in three separate semester-long courses, but this book provides a sound treatment of all three in about 250 pages. Each chapter begins with a discussion of the "factor of life" for the problem, mainly by means of examples. Numerical methods for the problem are then developed – but only those methods most widely used. The treatment of each method is brief and technical issues are minimized, but all the issues important in practice and for understanding the codes are discussed. The last part of each chapter is a tutorial that shows how to solve problems by means of small but realistic examples.

Mécanique des fluides, acoustique

D. F. PARKER. — **Fields, flows and waves: an introduction to continuum models.** — Springer undergraduate mathematics series — Un vol. broché, 18×24, de XII, 270 p. — ISBN 1-85233-708-7. — Prix: € 24.95. — Springer, London, 2003.

Mathematical ideas and techniques are widely used for describing collective phenomena in the physical and biological sciences. This book, derived from an innovative course of lectures, is a first introduction to the mathematical description of fields, flows and waves. It shows students, early in their studies, how many of the topics they have encountered are useful in constructing, analysing and interpreting phenomena in the real world. Designed for second-year undergraduate students in mathematics, mathematical physics, and engineering, it presumes only a limited familiarity with several variable calculus and vector fields. It develops the concepts of flux, conservation law and boundary value problem through simple examples of heat flow, electric potentials and gravitational fields. The ideas are developed through worked examples, and a range of exercises (with solutions) is provided to test understanding.