

Mécanique des fluides, acoustique

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Lionel PORCHERON. — **Maple : cours et applications : 1^{ère} et 2^e 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.

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Grzegorz LUKASZEWICZ. — **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. ПОТАПОВ. — **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

waves and asymptotic properties of the waves, time analogs of geometrical optics and quasi optics, and waves in nonstationary media. Finally, the third part (Chapters 9-12) is concerned with nonlinear waves and different forms of their modulation.

Mécanique quantique

David I. OLIVE, Peter C. WEST, (Editors). — **Duality and supersymmetric theories.** — Publications of the Newton Institute. — Un vol. relié, 16×23,5, de vii, 473 p. — ISBN 0-521-64158-6. — Prix: £45.00. — Cambridge University Press, Cambridge, 1999.

This book is the first systematic introduction to electromagnetic duality and its generalizations. The authors are the leading figures in this exciting new area of mathematical physics, and their lectures have been organized not only to link with each other but also to describe the fundamental ideas, the latest developments, and some earlier work whose significance has only recently become apparent. This will be essential reading for all those working in mathematical physics.

Roland OMNÈS. — **Understanding quantum mechanics.** — Un vol. relié, 16,5×24, de xiii, 307 p. — ISBN 0-691-00435-8. — Prix: US\$35.00. — Princeton University Press, Princeton, 1999.

This book presents a more streamlined version of the Copenhagen interpretation, showing its logical consistency and completeness. The problem of measurement is a major area of inquiry, with the author surveying its history from Planck to Heisenberg before describing the consistent-histories interpretation. He draws upon the most recent research on the decoherence effect (related to the modern resolution of the famous Schrödinger's cat problem) and an exact formulation of the correspondence between quantum and particle physics (implying a derivation of classical determinism from quantum probabilism).

Robin TICCIATI. — **Quantum field theory for mathematicians.** — Encyclopedia of mathematics and its applications, vol. 72. — Un vol. relié, 16×24, de xii, 699 p. — ISBN 0-521-63265-X. — Prix: £70.00. — Cambridge University Press, Cambridge, 1999.

The approach to quantum field theory in this book is part way between building a mathematical model of the subject and presenting the mathematics that physicists actually use. It starts with the need to combine special relativity and quantum mechanics and culminates in a basic understanding of the standard model of electroweak and strong interactions. The book is divided into five parts: canonical quantization of scalar fields; Weyl, Dirac and vector fields; functional integral quantization; the standard model of the electroweak and strong interactions; renormalization.

Physique statistique, structure de la matière

Y.M. GUTTMANN. — **The concept of probability in statistical physics.** — Cambridge studies in probability, induction, and decision theory. — Un vol. relié, 16×24, de xi, 267 p. — ISBN 0-521-62128-3. — Prix: £35.00. — Cambridge University Press, Cambridge, 1999.

This book fills an important gap in the literature by providing the most systematic study to date of how to interpret probabilistic assertions in the context of statistical mechanics. The book explores both subjectivist and objectivist accounts of probability, and takes full measure of recent work in the foundations of probability theory in statistical mechanics and mathematical theory. The book will be of particular interest to philosophers of science, physicists, and mathematicians interested in foundational issues, and also to historians of science.