

# Mécanique des fluides, acoustique

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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*<sup>®</sup>**. — 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.

Georges-Henri COTTET, Petros D. KOUMOUTSAKOS. — **Vortex methods: theory and practice.** — Un vol. relié, 16×24, de XIII, 313 p. — ISBN 0-521-62186-0. — Prix: £37.50. — Cambridge University Press, Cambridge, 2000.

The goal of this book is to present and analyze vortex methods as a tool for the direct numerical simulation of incompressible viscous flows. In the past two decades research in the numerical analysis aspects of vortex methods has provided a solid mathematical background for understanding the convergence features of the method and several new tools have been developed to generalize its applications. At the same time vortex methods retain their appealing physical character that was the motivation for their introduction. Scientists working in the areas of numerical analysis and fluid mechanics will benefit from this book, which may serve both communities as both a reference monograph and a textbook for computational fluid dynamics courses.

Julian L. DAVIS. — **Mathematics of wave propagation.** — Un vol. relié, 16×24, de xv, 394 p. — ISBN 0-691-02643-5. — Prix: US\$49.50. — Princeton University Press, Princeton, N.J., 2000.

Taking a medium-by-medium approach the author explains the mathematics needed to understand wave propagation in inviscid and viscous fluids, elastic solids, viscoelastic solids, and thermoelastic media, including hyperbolic partial differential equations and characteristics theory, which makes possible geometric solutions to nonlinear wave problems. The result is a clear and unified treatment of wave propagation that makes a diverse body of mathematics accessible to engineers, physicists, and applied mathematicians engaged in research on elasticity, aerodynamics, and fluid mechanics.

Antonio FASANO, (Editor). — **Complex flows in industrial processes.** — Modeling and simulation in science, engineering and technology. — Un vol. relié, 16×24, de x, 338 p. — ISBN 0-8176-4087-8. — Prix: SFr. 138.00. — Birkhäuser, Boston, 2000.

The book contains state-of-the-art surveys for select models and applications that offer the most illustrative use of new model analysis and application. The chapters are organized into three broad categories: flows of nonlinear materials, flows accompanied by thermal processes, and nonlinear flows in porous media. *Topics and features*: polymer viscosity; stability problems in extrusion; modeling of glass problems; pipelining of gases and slurries; polymerization process; thermally induced flows in polymer; composite materials manufacturing; flows through active porous media.

Viktor P. MASLOV, Petr P. MOSOLOV. — **Nonlinear wave equations perturbed by viscous terms.** — De Gruyter expositions in mathematics, vol. 31. — Un vol. relié, 17×24, de x, 329 p. — ISBN 3-11-015282-7. — Prix: DM 298.00. — Walter de Gruyter, Berlin, 2000.

This book deals with mathematical statements of a wide class of problems studied in mechanics. In particular, equations of one-dimensional barotropic gas, the Cauchy problem for equations of viscous compressible fluids, hyperbolic equations with small viscosity, and the theory of elasticity for media with different moduli of elasticity are studied. Admissible discontinuities of solutions are classified, and the problem of interaction of discontinuities is considered. The book is intended for scientists in mathematics and mechanics, as well as for graduate and post-graduate students.