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## *Mécanique des fluides, acoustique*

C. FOIAS, O. MANLEY, R. ROSA, R. TEMAM. — **Navier-Stokes equations and turbulence.** — Encyclopedia of mathematics and its applications, vol. 83. — Un vol. relié, 15×24, de XIII, 347 p. — ISBN 0-521-36032-3. — Prix: £60.00. — Cambridge University Press, Cambridge, 2001.

This book aims to bridge the gap between practicing mathematicians and the practitioners of turbulence theory. It presents the mathematical theory of turbulence to engineers and physicists as well as the physical theory of turbulence to mathematicians. The book is the result of many years of research by the authors, who analyse turbulence using Sobolev spaces and functional analysis. In this way the authors have recovered parts of the conventional theory of turbulence, deriving rigorously from the Navier-Stokes equations what had been arrived at earlier by phenomenological arguments. The mathematical technicalities are kept to a minimum within the book, enabling the discussion to be understood by a broad audience.

## *Thermodynamique classique, propagation de la chaleur*

Stephen H. DAVIS. — **Theory of solidification.** — Cambridge monographs on mechanics. — Un vol. relié, 16×23, de XIV, 385 p. — ISBN 0-521-65080-1. — Prix: £50.00. — Cambridge University Press, Cambridge, 2001.

The processes of freezing and melting were present at the beginning of the Earth and continue to affect the natural and industrial worlds. The solidification of a liquid or the melting of a solid involves a complex interplay of many physical effects. This book systematically presents the field of continuum solidification theory based on instability phenomena. An understanding of the physics is developed by using examples of increasing complexity with the object of creating a deep physical insight applicable to more complex problems.

## *Physique statistique, structure de la matière*

Pavel M. BLEHER, Alexander R. ITS, (Editors). — **Random matrix models and their applications.** — Mathematical Sciences Research Institute publications, 40. — Un vol. relié, 16,5×24,5, de X, 438 p. — ISBN 0-521-80209-1. — Prix: £45.00. — Cambridge University Press, Cambridge, 2001.

This volume of surveys and research results, based largely on lectures given at the Spring 1999 MSRI program of the same name, covers broad areas such as topologic and combinatorial aspects of random matrix theory; scaling limits, universalities and phase transitions in matrix models; universalities for random polynomials; and applications to integrable systems. Its stress on the interaction between physics and mathematics will make it a welcome addition to the shelves of graduate students and researchers in both fields, as will its expository emphasis.

## *Astronomie et astrophysique*

Archie O. PETERS, Harold LEVINE, Joachim WAMBSGANSS. — **Singularity theory and gravitational lensing.** — Progress in mathematical physics, vol. 21. — Un vol. relié, 19×25, de XXIV, 603 p. — ISBN 3-7643-3668-4. — Prix: SFr. 148.00. — Birkhäuser, Boston, 2001.

This monograph, unique in the literature, is the first to develop a mathematical theory of gravitational lensing. The theory applies to any finite number of deflector planes and highlights the distinctions between single and multiple plane lensing. Introductory material in Parts I and II

present historical highlights and the astrophysical aspects of the subject. Among the lensing topics discussed are multiple quasars, giant luminous arcs, Einstein rings, the detection of dark matter and planets with lensing, time delays and the age of the universe (Hubble's constant), microlensing of stars and quasars. The main part of the book – Part III – employs the ideas and results of singularity theory to put gravitational lensing on a rigorous mathematical foundation and solve certain key lensing problems. Results are published here for the first time.

### *Économie, recherche opérationnelle, jeux*

Karl Heinz BORGWARDT. — **Optimierung, Operations Research, Spieltheorie: mathematische Grundlagen.** — Un vol. broché, 17 × 24, de xx, 622 p. — ISBN 3-7643-6519-6. — Prix: SFr. 68.00. — Birkhäuser, Basel, 2001.

Das vorliegende Buch gibt eine mathematisch fundierte Einführung in die vier Themenbereiche lineare Optimierung, nichtlineare Optimierung, ganzzahlige und kombinatorische Optimierung sowie Spieltheorie. Es basiert auf Vorlesungen des Autors, die er während vielen Jahren gehalten hat. Das Buch ist gedacht als globale oder partielle Vorlage für Dozenten, die solche Themen lehren, für Studenten als Begleitmaterial für Vorlesungen oder zum Selbststudium, wofür ein elementarer mathematischer Hintergrund in Analysis und linearer Algebra vorausgesetzt wird. Die wesentlichen, grundlegenden Erkenntnisse und Begriffe der vier erwähnten Gebiete werden in einer präzisen, ausführlichen und doch einfachen Weise präsentiert und vollständig bewiesen. Die Darstellung wird unterstützt durch zahlreiche Abbildungen, Übungsaufgaben und vollständig durchgerechnete Beispiele.

### *Biologie et sciences du comportement*

Jianhong WU. — **Introduction to neural dynamics and signal transmission delay.** — De Gruyter series in nonlinear analysis and applications, vol. 6. — Un vol. relié, 18 × 24,5, de x, 182 p. — ISBN 3-11-016988-6. — Prix: DM 99.90. — Walter de Gruyter, Berlin, 2001.

This book gives an introduction to the mathematical modelling and analysis about the computational performance of neural networks from the viewpoint of dynamical systems. The text starts with a short description about the basic structure of a single neuron and the mechanisms of neural signal transmission. It then derives the general additive and shunting equations and describes popular signal transmission functions and network connection topologies. The focus of the book is on the connection between the convergence and global attractor of the model equations and the important cognitive tasks such as storing, recalling and recognizing neuron activation patterns and content-addressable memory performed by the networks.

### *Systèmes, contrôle optimal*

Jean-Paul GAUTHIER, Ivan KUPKA. — **Deterministic observation theory and applications.** — Un vol. relié, 15,5 × 23, de x, 226 p. — ISBN 0-521-80593-7. — Prix: £47.50. — Cambridge University Press, Cambridge, 2001.

The book presents a general theory as well as a constructive methodology to solve “observation problems”, that is, reconstructing the full information about a dynamical process on the basis of partial observed data. A general methodology to control processes on the basis of the observations is also developed. Illustrative but also practical applications in the chemical and petroleum industries are shown. This book is intended for use by scientists in the areas of automatic control, mathematics, chemical engineering, and physics.