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exhibits the principal families of solutions, such as kinks, pulses and periodic solutions, and their dependence on critical eigenvalue parameters. The text points to a rich structure, much of which still awaits to be explored. This book is meant for mathematicians who wish to become acquainted with new areas of partial and ordinary differential equations, for mathematical physicists who wish to learn about the theory developed for a class of well known higher order pattern-forming model equations, and for graduate students who are looking for an exciting and promising field of research.

### *Équations aux dérivées partielles*

Wolfgang ARENDT, Charles J.K. BATTY, Matthias HIEBER, Frank NEUBRANDER. — **Vector-valued Laplace transforms and Cauchy problems.** — Monographs in mathematics, vol. 96. — Un vol. relié,  $17,5 \times 24$ , de XI, 523 p. — ISBN 3-7643-6549-8. — Prix: SFr. 148.00. — Birkhäuser, Basel, 2001.

This monograph gives a systematic account of the theory of vector-valued Laplace transforms, ranging from representation theory to Tauberian theorems. In parallel, the theory of linear Cauchy problems and semigroups of operators is developed completely in the spirit of Laplace transforms. Existence and uniqueness, regularity, approximation and above all asymptotic behaviour of solutions are studied. Diverse applications to partial differential equations are given. The book contains an introduction to the Bochner integral and several appendices on background material. It is addressed to students and researchers interested in evolution equations, Laplace and Fourier transforms, and functional analysis.

Ferruccio COLOMBINI, Claude ZUILY, (Editors). — **Carleman estimates and applications to uniqueness and control theory.** — Progress in nonlinear differential equations and their applications, vol. 46. — Un vol. relié,  $16,5 \times 24$ , de VI, 211 p. — ISBN 0-8176-4230-7. — Prix: SFr. 178.00. — Birkhäuser, Boston, 2001.

This work consists of expository articles and research papers highlighting new results on Carleman estimates and their applications. The focus throughout is on unique continuation, control theory, and inverse problems. New results on strong uniqueness for second or higher order operators are explored in detail. Also examined are applications of Carleman estimates to stabilization, observability, and exact control for the wave and the Schrödinger equations. A final paper presents open problems on the controllability of linear and semilinear heat equations.

Ellis CUMBERBATCH, Alistair FITT, (Editors). — **Mathematical modeling: case studies from industry.** — Un vol. broché,  $15 \times 23$ , de XIII, 299 p. — ISBN 0-521-01173-6 (relié: 0-521-65007-0). — Prix: £23.95 (relié: £65.00). — Cambridge University Press, Cambridge, 2001.

This book deals with real industrial problems from real industries. Presented as a series of case studies by some of the world's most active and successful mathematicians working in industry, this volume shows clearly how the process of mathematical collaboration with industry can not only work successfully for the industrial partner, but also lead to interesting and important mathematics. Thirteen different problems are considered, ranging from cooking of cereal to the analysis of epidemic waves in animal populations.

Cristian E. GUTIÉRREZ. — **The Monge-Ampère equation.** — Progress in nonlinear differential equations and their applications, vol. 44. — Un vol. relié,  $16 \times 24$ , de XI, 126 p. — ISBN 3-7643-4177-7. — Prix: SFr. 118.00. — Birkhäuser, Boston, 2001.

The book is an essentially self-contained exposition of the theory of weak solutions, including the regularity results of L.A. Caffarelli. The presentation unfolds systematically from

introductory chapters, and an effort is made to present complete proofs of all theorems. Included are examples, illustrations, bibliographical references at the end of each chapter, and a comprehensive index. *Topics covered include:* Generalized solutions. Non-divergence equations. The cross-sections of Monge-Ampère. Convex solutions of  $D^2u = 1$  in  $\mathbf{R}^n$ . Regularity theory.  $W^{2,p}$  estimates.

Anatoly N. KOCHUBEI. — **Pseudo-differential equations and stochastics over non-Archimedean fields.** — Pure and applied mathematics, vol. 244. — Un vol. relié,  $16 \times 23,5$ , de XI, 316 p. — ISBN 0-8247-0655-2. — Prix: US\$ 165.00. — Marcel Dekker, New York, 2001.

This state-of-the-art reference provides comprehensive coverage of the most recent developments in the theory of non-Archimedean pseudo-differential equations and its applications to stochastic and mathematical physics – offering current methods of construction for stochastic processes in the field of  $p$ -adic numbers and related structures. The book examines elliptic and hyperbolic equations associated with  $p$ -adic quadratic forms... Green functions and their asymptotics... the Cauchy problem for the  $p$ -adic Schrödinger equation... spectral theory... Fourier transform, fractional differentiation operators, and analogs of the symmetric stable process... and more.

Victor P. PIKULIN, Stanislav I. POHOZAEV. — **Equations in mathematical physics: a practical course.** — Translated from the Russian by Andrei Iacob. — Un vol. relié,  $17 \times 24$ , de VIII, 206 p. — ISBN 3-7643-6501-3. — Prix: SFr. 148.00. — Birkhäuser, Basel, 2001.

Many physical processes in fields such as mechanics, thermodynamics, electricity, magnetism or optics are described by means of partial differential equations. The aim of the present book is to demonstrate the basic methods for solving the classical linear problems in mathematical physics of elliptic, parabolic and hyperbolic type. In particular, the methods of conformal mappings, Fourier analysis and Green's functions are considered, as well as the perturbation method and integral transformation method, among others. Every chapter contains concrete examples with a detailed analysis of their solution. The book is intended as a textbook for students in mathematical physics, but will also serve as a handbook for scientists and engineers.

## ***Systèmes dynamiques et théorie ergodique***

Jürgen MOSER. — **Stable and random motions in dynamical systems.** — With a new foreword by Philip J. Holmes. — Hermann Weyl Lectures, The Institute for Advanced Study. — Princeton landmarks in mathematics. — Un vol. broché,  $15,5 \times 23,5$ , de XII, 198 p. — ISBN 0-691-08910-8. — Prix: US\$ 14.95. — Princeton University Press, Princeton, 2001.

For centuries, astronomers have been interested in the motions of the planets and in methods to calculate their orbits. Since Newton, mathematicians have been fascinated by the related  $N$ -body problem. They seek to find solutions to the equations of motion for  $N$  masspoints interacting with an inverse-square-law force and to determine whether there are quasi-periodic orbits or not. Attempts to answer such questions have led to the techniques of nonlinear dynamics and chaos theory. In this classic work, the author presents a succinct account of two pillars of the theory: stable and chaotic behavior. He discusses cases in which  $N$ -body motions are stable, covering topics such as Hamiltonian systems, the (Moser) twist theorem, and aspects of Kolmogorov-Arnold-Moser theory. He then explores chaotic orbits, exemplified in a restricted three-body problem, and describes the existence and importance of homoclinic points. This book is indispensable for mathematicians, physicists, and astronomers interested in the dynamics of few- and many-body systems and in fundamental ideas and methods for their analysis.