

# Systemes dynamiques et theorie ergodique

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concentrating on methods involving the use of surface potentials. It provides the first detailed exposition of the mathematical theory of boundary integral equations of the first kind on non-smooth domains. Included are chapters on three specific examples: the Laplace equation, the Helmholtz equation and the equations of linear elasticity.

Frank PACARD, Tristan RIVIÈRE. — **Linear and nonlinear aspects of vortices: the Ginzburg-Landau model.** — Progress in nonlinear differential equations and their applications, vol. 39. — Un vol. relié, 16,5 × 24, de x, 342 p. — ISBN 0-8176-4133-5. — Prix: SFr. 148.00. — Birkhäuser, Boston, 2000.

Ginzburg-Landau equations are relevant in modeling a number of phenomena in physics, including phase transition in superconductors, superfluids, Yang-Mills-Higgs fields, and more generally, Abelian gauge theory. The sets where the “wave function” vanishes are commonly called vortices. These most intriguing objects from both a physical and mathematical point of view pose a number of important questions examined in this text. The main achievement of this monograph is the precise description of a one-to-one correspondence between the admissible configurations of vortices and the space of solutions of the Ginzburg-Landau equations. The analysis is fairly self-contained and uses an approach and techniques that differ greatly from earlier studies of Ginzburg-Landau vortices, which emphasize the variational aspects of the problem. The approach here is based on the extensive use of Sobolev and Hölder weighted spaces, gluing methods for nonlinear partial differential equations, conformal fields, and derivations of conservation laws. Of particular importance is the interaction and central role of linear spectral analysis and the nonlinearities of the Ginzburg-Landau equations.

Olle STORMARK. — **Lie’s structural approach to PDE systems.** — Encyclopedia of mathematics and its applications, vol. 80. — Un vol. relié, 16,5 × 24, de xv, 572 p. — ISBN 0-521-78088-8. — Prix: £70.00. — Cambridge University Press, Cambridge, 2000.

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.

## *Systemes dynamiques et théorie ergodique*

Viviane BALADI. — **Positive transfer operators and decay of correlations.** — Advanced series in nonlinear dynamics, vol. 16. — Un vol. relié, 16 × 22,5, de x, 314 p. — ISBN 981-02-3328-0. — Prix: £34.00. — World Scientific, Singapore, 2000.

Although individual orbits of chaotic dynamical systems are by definition unpredictable, the average behavior of typical trajectories can often be given a precise statistical description. Indeed, there often exist ergodic invariant measures with special additional features. For a given invariant measure, and a class of observables, the correlation functions tell whether (and how fast) the system “mixes”, that is, “forgets” its initial conditions. This book addressed to mathematical (or mathematically inclined) physicists, shows how the powerful technology of transfer operators, imported from statistical physics, has been used recently to construct relevant invariant measures, and to study the speed of decay of their correlation functions, for many chaotic systems. Links with dynamical zeta functions are explained.

M. Bachir BEKKA, Matthias MAYER. — **Ergodic theory and topological dynamics of group actions on homogeneous spaces.** — London Mathematical Society lecture note series, vol. 269. — Un vol. broché, 15×23, de vii, 200 p. — ISBN 0521-66030-0. — Prix: £24.95. — Cambridge University Press, Cambridge, 2000.

The study of geodesic flows on homogeneous spaces is an area of research that has in recent years yielded some fascinating developments. This book focuses on many of these, and one of its highlights is an elementary and complete proof (due to Margulis and Dani) of Oppenheim's conjecture. Also included here: an exposition of Ratner's work on Raghunathan's conjectures; a complete proof of the Howe-Moore vanishing theorem for general semisimple Lie groups; new treatment of Mautner's result on the geodesic flow of Riemannian symmetric space; Mozes' result about mixing of all orders and the asymptotic distribution of lattice points in the hyperbolic plane; Ledrappier's example of mixing action which is not a mixing of all orders.

F. BLANCHARD, A. MAASS, A. NOGUEIRA, (Editors). — **Topics in symbolic dynamics and applications.** — London Mathematical Society lecture note series, vol. 279. — Un vol. broché, 15×23, de xvi, 245 p. — ISBN 0-521-79660-1. — Prix: £24.95. — Cambridge University Press, Cambridge, 2000.

This book is devoted to recent developments in symbolic dynamics, and it comprises eight chapters. The first two are concerned with the study of symbolic sequences of "low complexity", the following two introduce "high complexity" systems. Chapter five presents results on asymptotic laws for the random times of occurrence of rare events. Chapter six deals with diophantine problems and combinatorial Ramsey theory. Chapter seven looks at the dynamics of symbolic systems arising from numeration systems, and finally chapter eight gives a complete description of the symbolic dynamics of Lorenz maps.

M. FOREMAN, A.S. KECHRIS, A. LOUVEAU, B. WEISS, (Editors). — **Descriptive set theory and dynamical systems.** — London Mathematical Society lecture note series, vol. 277. — Un vol. broché, 15×23, de 291 p. — ISBN 0-521-78644-4. — Prix: £27.95. — Cambridge University Press, Cambridge, 2000.

In recent years there has been a growing interest in the interactions of descriptive set theory and various aspects of the theory of dynamical systems, including ergodic theory and topological dynamics. This volume contains a collection of survey papers by leading researchers covering a wide variety of recent developments in these two subjects and their interconnections. This book provides researchers and graduate students interested in either of these areas, with a guide to work done in the other, as well as an introduction to problems and research directions arising from their interconnections.

Michel L. LAPIDUS, Machiel VAN FRANKENHUYSEN. — **Fractal geometry and number theory: complex dimensions of fractal strings and zeros of zeta functions.** — Un vol. relié, 16×24, de x, 268 p. — ISBN 0-8176-4098-3. — Prix: SFr. 98.00. — Birkhäuser, Boston, 2000.

Number theory and fractal geometry are combined in this study of the vibrations of fractal strings, that is, one dimensional drums with fractal boundary, and of the zeros of zeta functions. An explicit formula, originally developed for the proof of the prime number theorem, is extended here to apply to the zeta functions associated with fractals. This theory of complex dimensions enables a precise description of the oscillations in the geometry or in the spectrum of fractal strings. A combination of analytical and geometric methods is used to also establish new results about vertical distribution of zeros of number-theoretic and many other zeta functions.

Rafael DE LA LLAVE, Linda R. PETZOLD, Jens LORENZ, (Editors). — **Dynamics of algorithms.** — The IMA volumes in mathematics and its applications, vol. 118. — Un vol. relié,  $16,5 \times 24,5$ , de IX, 136 p. — ISBN 0-387-98920-X. — Prix: DM 120.00. — Springer, New York, 2000.

The articles collected in this volume represent the contributions presented at the IMA Workshop on Dynamics of Algorithms which took place in November 1997. The workshop was an integral part of the 1997 to 1998 IMA Program on Emerging Applications of Dynamical Systems. The interaction between algorithms and dynamical systems is mutually beneficial since dynamical methods can be used to study algorithms which are applied repeatedly. Convergence and asymptotic rates are indeed dynamical properties. Likewise, the study of dynamical systems benefits enormously from having efficient algorithms to compute dynamical objects.

### *Equations aux différences finies, équations fonctionnelles*

Themistocles M. RASSIAS. — **Functional equations and inequalities.** — Mathematics and its applications, vol. 518. — Un vol. relié,  $16,5 \times 24,5$ , de XI, 336 p. — ISBN 0-7923-6484-8. — Prix: Dfl. 275.00. — Kluwer Academic Publishers, Dordrecht, 2000.

This volume provides an extensive study of some of the most important topics of current interest in functional equations and inequalities. Subjects dealt with include: a Pythagorean functional equation, a functional definition of trigonometric functions, the functional equation of the square root spiral, a conditional Cauchy functional equation, an iterative functional equation, the Hille-type functional equation, the polynomial-like iterative functional equations, a qualitative study of Lobachevsky's complex functional equations, functional inequalities in special classes of functions, replicativity and function spaces, normal distributions, some difference equations, finite sum decompositions of functions, the problem of expressibility in some extensions of free groups, Alexandrov problem and mappings which preserve distances, etc.

### *Approximations et développements en série*

George A. ANASTASSIOU, Sorin G. GAL. — **Approximation theory: moduli of continuity and global smoothness preservation.** — Un vol. relié,  $16 \times 24$ , de XI, 525 p. — ISBN 0-8176-4151-3. — Prix: SFr. 158.00. — Birkhäuser, Boston, 2000.

This monograph, in two parts, is an intensive and comprehensive study of the computational aspects of the moduli of smoothness and the Global Smoothness Preservation Property (GSPP). Key features include: Systematic and extensive study of the computation of moduli of continuity and GSPP, presented for the first time in the book literature; substantial motivation and examples for key results; extensive applications of moduli of smoothness and GSPP concepts to approximation theory, probability theory, numerical and functional analysis; GSPP methods to benefit engineers in computer-aided geometric design; bibliography and index.

### *Analyse de Fourier, analyse harmonique abstraite*

Tian-Xia HE. (Editor). — **Wavelet analysis and multiresolution methods.** — Proceedings of the conference held at the University of Illinois at Urbana-Champaign, Illinois. — Lecture notes in pure and applied mathematics, vol. 212. — Un vol. broché,  $17,5 \times 25,5$ , de VIII, 382 p. — ISBN 0-8247-0417-7. — Prix: US\$ 185.00. — Marcel Dekker, New York, 2000.

This volume contains a selection of papers presented at the Wavelet Analysis and Multiresolution Methods Session of the American Mathematical Society Meeting held recently at the University of Illinois at Urbana-Champaign. Offering self-contained papers that include an