symmetry methods. These methods can be applied to differential equations of an unfamiliar type; they do not rely on special tricks. Instead, a given differential equation can be made to reveal its symmetries, which are then used to construct exact solutions. This book is a straightforward introduction to symmetry methods. The presentation is informal with many worked examples. The text contains several new methods. In particular, methods for obtaining discrete symmetries and first integrals are described.

Equations aux dérivées partielles

Jürgen M. APPELL, Anatolij S. KALITVIN, Petr P. ZABREJKO. — **Partial integral operators and integro-differential equations.** — Pure and applied mathematics. Monographs and textbooks in pure and applied mathematics, vol. 230. — Un vol. relié, 16×23,5, de x, 560 p. — ISBN 0-8247-0396-0. — Prix: US$195.00. — Marcel Dekker, New York, 2000.

With results and methods ranging from abstract functional-analytic approaches to specific uses in continuum mechanics and engineering, this monograph discusses the theory and applications of partial integral operators as well as linear and nonlinear equations... unifies the classical theory of differential equations in Banach spaces with the latest findings on integral operators... makes nonlinear partial integral equations more accessible... contains a wealth of details on the analytical, topological, and spectral properties of partial integral operators in spaces of continuous and measurable functions... and gathers a comprehensive list of about 400 references, many in Russian, which have been scattered throughout specialized research journals until now.

Heinrich G.W. BEGEHR, A. Okay CELEBI and Wolfgang TUTSCHKE, (Editors). — **Complex methods for partial differential equations.** — International Society for Analysis, Applications and Computation, vol. 6. — Un vol. relié, 16×25, de x, 331 p. — ISBN 0-7923-6000-1. — Prix: Dfl. 260.00. — Kluwer Academic Publishers, Dordrecht, 1999.

This book contains survey chapters as well as state-of-the art research chapters on topics ranging from complex elliptic first order systems with regular or singular coefficients to overdetermined systems in several complex variables and partial differential equations in Clifford analysis. Different boundary value problems are studied. Applications to crack problems in elasticity theory to cusped bars, plates, and shells are given. Wavelets transformations are constructed in Banach spaces and used to identify complex analysis from the viewpoint of geometry. Fixed-point problems even in abstract Banach spaces are investigated with respect to an optimal domain of existence for the solution.

Jan W. CHOLEWA, Tomasz DLOTKO. — **Global attractors in abstract parabolic problems.** — In cooperation with Nathaniel Chaffee. — London Mathematical Society lecture note series, vol. 278. — Un vol. broché, 15×23, de XII, 235 p. — ISBN 0-521-79424-2. — Prix: £27.95. — Cambridge University Press, Cambridge, 2000.

The study of dissipative equations is an area that has attracted substantial attention over many years. Much progress has been achieved using a combination of both finite dimensional and infinite dimensional techniques, and in this book the authors exploit these same ideas to investigate the asymptotic behavior of dynamical systems corresponding to parabolic equations. In particular the theory of global attractors is presented in detail. Extensive auxiliary material and rich references make this self contained book suitable as an introduction for graduate students, and experts from other areas, who wish to enter this field.

Paul DONATO. — **Calcul différentiel pour la licence: cours, exercices et problèmes résolus.** — Sciences Sup, cours, 2ᵉ cycle, Ecoles d'ingénieurs. — Un vol. broché, 17×24, de IX, 189 p. — ISBN 2-10-004723-X. — Prix: FF 120.00. — Dunod, Paris, 2000, diffusé en Suisse par Havas Services Suisse, Fribourg.

Ce livre aborde de manière détaillée les thèmes suivants: le théorème de la moyenne et ses conséquences, les diverses formules de Taylor, l'étude des extrema simples et liés (multiplicateurs de Lagrange), les théorèmes d'inversion locale, des fonctions implicites et du rang constant. Le dernier chapitre est consacré aux théorèmes classiques d'existence des solutions d'équations différentielles, ainsi qu'à une introduction aux flots des champs de vecteurs. Les sous-variétés de $\mathbf{R}^n$ font l'objet d'un traitement autonome dans lequel est abordée la géométrie des surfaces, notamment l'étude de leur courbure. Le cours est complété par une série d'exemples et d'exercices tous corrigés, et de problèmes dont certains sont résolus.

Todor V. GRAMCHEV, Peter R. POPIVANOV. — **Partial differential equations: approximate solutions in scales of functional spaces.** — Mathematical research, vol. 108. — Un vol. broché, 17×24, de 155 p. — ISBN 3-527-40138-5. — Prix: DM 148.00. — Wiley-VCH, Berlin, 2000.

In this volume, the authors deal with the following themes: Microlocal properties of pseudo-differential operators with multiple characteristics of involutive type in the framework of the Sobolev spaces; abstract schemes for constructing approximate solutions to linear partial differential equations with characteristics of constant multiplicity $m \geq 2$ in the framework of Gevrey spaces; local solvability, hypoellipticity and singular solutions in Gevrey spaces; global Gevrey solvability on the torus for linear partial differential equations; applications of asymptotic methods for local (non)solvability for quasihomogeneous operators; applications of Airy asymptotic solutions to degenerate oblique derivative problems for second order strictly hyperbolic equations; approximate Gevrey normal forms of analytic involutions and analytic glancing hypersurfaces with applications for effective stability estimates for billiard ball maps.

Irena LASIECKA, Roberto TRIGGIANI. — **Control theory for partial differential equations: continuous and approximation theories, vol. 1: Abstract parabolic systems.** — Encyclopedia of mathematics and its applications, vol. 74-75. — Un vol. relié, 16,5×24, de XXI, 644 p. — ISBN 0-521-43408-4. — Prix: £75.00. — Cambridge University Press, Cambridge, 2000.

This is the first volume of a comprehensive and up-to-date treatment of quadratic optimal control theory for partial differential equations over a finite or infinite time horizon and related differential (integral) and algebraic Riccati equations. A key feature of this treatise is the wealth of concrete multidimensional PDE illustrations, which fit naturally into the abstract theory. Volume 1 covers the abstract parabolic theory, including both the finite and infinite horizon optimal control problems, as well as the corresponding min-max theory with nondefinite quadratic cost. A lengthy chapter presents many multidimensional PDE illustrations with boundary/point control and observation. These include not only the traditional parabolic equations, such as the heat equation, but also second-order equations with structural ("high") damping, as well as thermo-elastic plate equations. Recently discovered, critical dynamical properties are provided in detail. Many of these new results are appearing here in print for the first time.

William MCLEAN. — **Strongly elliptic systems and boundary integral equations.** — Un vol. broché, 15×23, de XIV, 357 p. — ISBN 0-521-66375-X. — Prix: £20.95. — Cambridge University Press, Cambridge, 2000.

Partial differential equations provide mathematical models of many important problems in the physical sciences and engineering. This book treats one class of such equations,

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.

Systèmes 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.