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## BULLETIN BIBLIOGRAPHIQUE

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J.F.C. KINGMAN. — **Poisson processes**. — Oxford studies in probability, vol. 3. — Un vol. relié,  $16 \times 24$ , de VIII, 104 p. — Prix: £22.50. — Clarendon Press, Oxford, 1993.

In the theory of random processes there are two that are fundamental, and occur over and over again, often in surprising ways. One, the Bachelier-Wiener model of Brownian motion, has been the subject of many books. The other, the Poisson process, seems at first sight humbler and less worthy of study in its own right. Nearly every book mentions it, but most hurry past to more general point processes or Markov chains. This comparative neglect is ill-judged, and stems from a lack of perception of the real importance of the Poisson process. This book attempts to redress the balance. It records the author's fascination with the beauty and wide applicability of Poisson processes in one or more dimensions.

Malcolm CLARK. — **A plain TEX primer**. — Un vol. broché,  $15,5 \times 23,5$ , de 481 p. — Prix: £19.50. — Oxford University Press, Oxford, 1992.

TEX is an advanced typesetting and page make-up system in use on over fifty different types of personal, mini-, and mainframe computers worldwide. This primer introduces TEX, providing the reader with sufficient information to get started with the majority of tasks which she or he wishes to tackle. Not only is the book a "primer", it is a "plain" TEX primer. Wherever TEX is running, it comes with at least one basic style definition, called "plain". This is a common starting point for many TEX users. It is a useful basic style, and lends itself to extension and modification to suit a wide range of individual needs. With the aid of this book, scientists and researchers preparing their own books and papers, or technical typists, used to the conventions and jargon of their field, will find little difficulty in adopting TEX's approach.

Frederick BLOOM. — **Mathematical problems of classical nonlinear electromagnetic theory**. — Pitman monographs and surveys in pure and applied mathematics, vol. 63. — Un vol. relié,  $16 \times 24$ , de 386 p. — Prix: £56.00. — Longman Scientific and Technical, Harlow, Essex, 1993.

The primary goal of this book is to give mathematicians, applied mathematicians, and engineers a survey of some problems of current interest in the realm of classical nonlinear electromagnetic theory. A secondary aim is the presentation of the wide variety of mathematical techniques which may be employed to study such problems. Among the problems treated are those which involve the propagation of electromagnetic waves in nonlinear dielectric media, the transmission of signals on distributed parameter nonlinear lines, and nonlocal problems such as the determination of the equilibrium states of nonlinearly elastic current-bearing wires placed in ambient magnetic field.

Mark POLLICOTT. — **Lectures on ergodic theory and Pesin theory on compact manifolds**. — London Mathematical Society lecture note series, vol. 180. — Un vol. broché,  $15 \times 23$ , de IX, 162 p. — Prix: £19.95. — Cambridge University Press, Cambridge, 1993.

Pesin theory consists of the study of non-uniformly hyperbolic diffeomorphisms. The aim of this book is to provide the reader with a straightforward account of this theory, following



the approaches of Katok and Newhouse. The notes are divided into two parts: the first develops the basic theory, starting with general ergodic theory and introducing Liapunov exponents. Part II deals with the applications of Pesin theory and contains an account of the existence (and distribution) of periodic points; it closes with a look at stable manifolds, and gives some results on absolute continuity. The author only assumes that the reader has a good background of undergraduate analysis, making the book accessible to complete newcomers to the field.

T.A. BICK. — **Elementary boundary value problems.** — Pure and applied mathematics, vol. 174. — Un vol. relié,  $16 \times 23,5$ , de VIII, 248 p. — Prix: £49.75. — Marcel Dekker, Inc., New York, 1993.

Emphasizing the unifying nature of the material, "Elementary boundary value problems" constructs physical models for both bounded and unbounded domains using rectangular and other coordinate systems... develops methods of characteristics, eigenfunction expansions, and transform procedures using the traditional Fourier series, D'Alembert's method, and Fourier integral transforms... makes explicit connections with linear algebra, analysis, complex variables, set theory, and topology in response to the need to solve BVPs... presents illustrative examples in science and engineering, etc...

**Geometric analysis and nonlinear partial differential equations.** — Edited by Ilya J. Bakelman. — Lecture notes in pure and applied mathematics, vol. 144. — Un vol. broché,  $17,5 \times 25,5$ , de XII, 303 p. — Prix: US\$5.00. — Marcel Dekker, Inc., New York, 1993.

Written by more than 15 authorities in the field, the book presents methods and results of the convex bodies and geometric inequalities theory and its applications to differential equations, geometry, and mathematical physics... details recent studies on Monge-Ampère equations, emphasizing geometric inequalities governing a priori estimates of solutions and existence theorems of the Dirichlet problem for convex generalized solutions... examines the generalization of the isoperimetric inequality for two dimensional general convex surfaces whose integral Gaussian curvature is less than 2... contains open problems on the theory of surfaces with constant mean curvature, etc...

Monique PAVEL. — **Fundamentals of pattern recognition.** — Second edition, revised and expanded. — Pure and applied mathematics, vol. 174. — Un vol. relié,  $16 \times 23,5$ , de XII, 254 p. — Prix: US\$99.75. — Marcel Dekker, Inc., New York, 1993.

Revised, updated, and expanded throughout, this edition addresses the field of pattern recognition from a basic mathematical viewpoint, treating algebraic, topological, and categorical approaches of the domain, using concepts from homotopy, shape, and fiber spaces theories as well as computational topology. This edition provides a new section on fiberwise topology that formalizes, for the first time, multicolored, different gray level pictures and other complex signals consisting of base and value spaces and their interconnections... explores new artificial intelligence problems on the possible interplay between recursion theory and fiberwise image topology... develops new figures of panoramic hierarchical classifications of all mathematical approaches to pattern recognition discussed, etc...

**The unreasonable effectiveness of number theory.** — Edited by Stefan A. Burr. — Proceedings of symposia in applied mathematics, vol. 46. — Un vol. relié,  $18 \times 26$ , de X, 125 p. — Prix: £25.50. — American Mathematical Society, Providence, RI, distributed by Oxford University Press, London, 1992.

These are the lecture notes prepared for the American Mathematical Society short course held in Orono, Maine, August 6-7, 1991. This short course provided some views into the great

breadth of applications of number theory outside cryptology and highlighted the power and applicability of number theoretic ideas. Contents: — Manfred R. Schroeder: The unreasonable effectiveness of number theory in physics, communication and music. — George E. Andrews: The reasonable and unreasonable effectiveness of number theory in statistical mechanics. — J.C. Lagarias: Number theory and dynamical systems. — George Marsaglia: The mathematics of random number generators. — Vera Pless: Cyclotomy and cyclic codes. — M. Douglas McIlroy: Number theory in computer graphics.

Simon GINDIKIN. — **Tube domains and the Cauchy problem.** — Translations of mathematical monographs, vol. 111. — Un vol. relié,  $18 \times 26$ , de v, 132 p. — Prix: £53.50. — American Mathematical Society, Providence, RI, distributed by Oxford University Press, London, 1992.

The Cauchy problem in spaces of distributions with exponential estimates: Spaces of functions (distributions) of exponential decrease (growth). Convolution operators and convolution equations. Convolution equations in a strip and the nonhomogeneous Cauchy problem for convolution equations. The Cauchy problem for exponentially correct differential operators with variable coefficients. Special classes of exponentially correct differential operators. — The strongly homogeneous differential operators: The structure of affine-homogeneous domains. Compound power functions and Siegel integrals. Riemann-Liouville operators and differential operators associated to homogeneous cones. Analysis of fundamental solutions of differential operators related to linear-homogeneous cones. Pluriparabolic strongly homogeneous differential operators.

M. Ya ANTIMIROV, A.A. KOLYSHKIN, Rémi VAILLANCOURT. — **Applied integral transforms.** — CRM monograph series, vol. 2. — Un vol. relié,  $18 \times 26$ , de XVIII, 265 p. Prix: £45.50. — American Mathematical Society, Providence, RI, distributed by Oxford University Press, Oxford, 1993.

From the preface: Among the many books on integral transforms in science and engineering, few construct the kernels of the integral transforms by solving the generalized Sturm-Liouville problems associated with the partial differential equations in hand. In the first part of this book kernels of integral transforms are constructed by the above technique and used to solve elementary problems of mathematical physics. In the second part of the book, the method of integral transforms is used to solve modern applied problems in convective stability, temperature fields in oil strata and eddy current testing. The choice of these problems was made in line with the author's research experience and involvement with industrial applications...

George W. MACKEY. — **The scope and history of commutative and noncommutative harmonic analysis.** — History of mathematics, vol. 5. — Un vol. relié,  $18,5 \times 26$ , de XVI, 370 p. — Prix: £36.00. — American Mathematical Society, Providence, RI, distributed by Oxford University Press, Oxford, 1992.

Introduction. — Harmonic analysis as the exploitation of symmetry: a historical survey. — Herman Weyl and the application of group theory to quantum mechanics. — The significance of invariant measures for harmonic analysis. — Weyl's program and modern physics. — Induced representations and the applications of harmonic analysis. — Von Neumann and the early days of ergodic theory.

**Emerging applications in free boundary problems.** — Proceedings of the International Colloquium “Free Boundary Problems: Theory and Applications”. — John M. Chadam and Henning Rasmussen (editors). — Pitman research notes in mathematics series, vol. 280. — Un vol. broché,  $17 \times 24,5$ , de 272 p. — Prix: £29.00. — Longman Scientific & Technical, Harlow, Essex, 1993.

This is the first of three volumes containing the proceedings of the International Colloquium “Free Boundary Problems: Theory and Applications”, held in Montreal (Canada) from June 13 to June 22, 1990. The papers included in the special session on microgravity deal with flow and surface tension in low gravity. Mathematical modelling of chemical and biological reactions in another rapidly advancing area giving rise to many new types of free boundary problems including motion by mean curvature. This volume contains a wide spectrum of papers in this area covering applications from combustion in porous media to controlled release of drugs by osmosis. Some of the theoretical results in this approach as well as some applications to jets and shape memory alloys appear in this volume. The last section deals with free boundary problems from the semiconductor industry.

**Free boundary problems involving solids.** — Proceedings of the International Colloquium “Free Boundary Problems: Theory and Applications”. — John M. Chadam and Henning Rasmussen (editors). — Pitman Research Notes in Mathematics Series ; vol 281. — Un vol. broché,  $17 \times 24,5$ , de 243 p. — Prix: £26.00. — Longman Scientific & Technical, Harlow, Essex, 1993.

This is the second of three volumes containing the proceedings of the International Colloquium “Free Boundary Problems: Theory and Applications”, held in Montreal (Canada) from June 13 to June 22, 1990. The main theme of this volume is the concept of free boundary problems associated with solids. The first free boundary problem, the freezing of water — the Stefan problem — is the prototype of solidification problems which form the main part of this volume. The two sections treating this subject cover a large variety of topics and procedures, ranging from a theoretical mathematical treatment of solvability to numerical procedures for practical problems. Some new and interesting problems in solid mechanics are discussed in the first section while in the last section the important new subject of solid-solid phase transition is examined.

**Free boundary problems in fluid flow with applications.** — Proceedings of the International Colloquium “Free Boundary Problems: Theory and applications”. — John M. Chadam and Henning Rasmussen (Editors). — Pitman research notes in mathematics series, vol. 282. — Un vol. broché,  $17 \times 24,5$ , de 253 p. — Prix: £27.00. — Longman Scientific & Technical, Harlow, Essex, 1993.

This is the third of three volumes containing the proceedings of the International Colloquium “Free Boundary Problems: Theory and Applications”, held in Montreal (Canada) from June 13 to June 22, 1990. The main part of this volume studies the flow of fluids, an area which has led to many of the classical free boundary problems. The first two sections contain the papers on various problems in fluid mechanics. The types of problems vary from the collision of two jets to the growth of a sand wave. In the next two sections porous flow is considered. This has important practical applications in fields such as petroleum engineering and groundwater pollution. Some new and interesting free boundary problems in geology and engineering are treated in the final section.

Michael F. BARNSELY, Lyman P. HURD. — **Fractal image compression.** — Illustrations by Louisa F. Anson. — AK Peters books in computer science and related areas. — Un vol. relié,  $15,5 \times 23,5$ , de XI, 244 p. — Prix: US\$49.95. — A.K. Peters, Wellesley, Mass., 1993.

The book presents the mathematical ideas and practical techniques for compressing real world images by means of fractals. The authors describe in detail the workings of the fractal transform and lay out the methodology for the approximation of real world images by fractal transform fractals. They offer a formal description of an automatic fractal image compression system for binary, black-and-white images as well as a simple, computationally feasible process for grayscale images. The book includes a model digital implementation in C to illustrate the inner workings of such a system. The appendix on the JPEG Discrete Cosine Transform is included to give the reader an understanding of how non-fractal image compression works.

V. KOLMANOVSKII and A. MYSHKIS. — **Applied theory of functional differential equations.** — Mathematics and its applications (Soviet Series), vol. 85. — Un vol. relié,  $16,5 \times 25$ , de xv, 234 p. — Prix: Dfl. 160.00, US\$99.00, £57.00. — Kluwer Academic Publishers, Dordrecht, 1992.

This book provides an introduction to the properties of functional differential equations and their applications in diverse fields such as immunology, nuclear power generation etc. In particular it deals with problems and methods relating to systems having a memory (hereditary systems). Chapter 1 explains where functional differential equations come from and what sort of problems arise in applications. Chapter 2 gives a broad introduction to the basic principle involved and deals with systems having discrete and distributed delay. Chapters 3-5 are devoted to stability problems for retarded, neutral and stochastic functional differential equations. Problems of optimal control and estimation are considered in Chapters 6-8.

Jean-Luc BRYLINSKI. — **Loop spaces, characteristic classes and geometric quantization.** — Progress in mathematics, vol. 107. — Un vol. relié,  $16 \times 24$ , de xvi, 300 p. — Prix: SFr. 84.00. — Birkhäuser, Boston, 1992.

This book develops a Chern-Weil theory of characteristic classes of gerbes. Gerbes (invented by Giraud) are fiber bundles whose fibers are groupoids (certain categories). Gerbes arise naturally in geometry... A product of this theory is a geometric construction of ordinary degree 3 cohomology of manifolds, with applications to loop spaces and loop groups, group cohomology and Cheeger-Simons classes, Deligne cohomology, and the geometric quantization of the magnetic monopole. The book also gives the construction of a holomorphic line bundle over the space of singular knots in a smooth 3-manifold, and discusses the Kähler structure of this space of knots.

This book is written for graduate students as well as researchers. It has a self-contained introduction to the theory of sheaves and their cohomology, line bundles and geometric prequantization à la Kostant-Souriau.

**Séminaire de théorie des nombres, Paris, 1990-91.** — Edited by Sinnou David. — Progress in mathematics, vol. 108. — Un vol. relié,  $16 \times 24$ , de xvi, 279 p. — Prix: SFr. 136.00. — Birkhäuser, Boston, 1993.

S. Bosch: Riemann's period relations. — J. Brüder: A note on cubic exponential sums. — H. Cohen, F. Diaz y Diaz et M. Olivier: Calculs de nombres de classes et de régulateurs de corps quadratiques en temps sous-exponentiel. — J.C. Douai: Monodromie et arithmétique des surfaces. — E. Fouvry: Sur le comportement en moyenne du rang des courbes  $y^2 = x^3 + k$ . — G. Henniart: Correspondance de Jacquet-Langlands explicite I: le cas modéré de degré

premier. — A. Ivic: La valeur moyenne de la fonction zeta de Riemann. — J. Nekovar: On  $p$ -adic height pairings. — B. Perrin-Riou: Théorie d'Iwasawa et hauteurs  $p$ -adiques. — A. Silverberg: Galois representations attached to points on Shimura varieties. — J. van der Poorten: Power series representing algebraic functions. — Y.G. Zarhin: Abelian varieties of K3 type.

**Computational algebraic geometry.** — Edited by Frédéric Eyssette, André Galligo. — Progress in mathematics, vol. 109. — Un vol. relié,  $16 \times 24$ , de IX, 328 p. — Prix: SFr. 118.00. — Birkhäuser, Boston, 1993.

The major themes covered in this volume, arising from papers presented at the conference MEGA-92, were: effective methods and complexity issues in commutative algebra, projective geometry, real geometry, and algebraic number theory, and algebro-geometric methods in algebraic computing and applications. MEGA-92 was the second of a new series of European conferences on the general theme of Effective Methods in Algebraic Geometry. It was held in Nice, France, on April 21-25, 1992 and built on the themes presented at MEGA-90 (Castiglione, Italy 1990).

Gianni DAL MASO. — **An introduction to G-convergence.** — Progress in nonlinear differential equations and their applications, vol. 8. — Un vol. relié,  $16 \times 24$ , de XI, 340 p. — Prix: SFr. 118.00. — Birkhäuser, Boston, 1993.

This book provides a self-contained systematic presentation of a notion of “variational convergence”, called G-convergence... The first part of the book deals with the abstract theory of G-convergence for functionals defined on arbitrary topological spaces, with a chapter devoted to new results concerning the topology of G-convergence in the case, frequent in applications to the calculus of variations, where the underlying space is not locally compact. The second part is devoted to the study of the asymptotic behavior of integral functionals of the calculus of variations subject to severe perturbations, with applications to homogenization problems. These topics are developed in the most general situation, both in the coercive and in the non-coercive case. The main feature of the book is a thorough treatment of the localization method and of its measure theoretic background, including the proof of a very general integral representation theorem for local functionals.

**Topology design of structures.** — Edited by Martin Bendsoe and Carlos A. Mota Soares. — NATO ASI series, Series E: Applied sciences, vol. 227. — Un vol. relié,  $27 \times 25$ , de XVI, 569 p. — Prix: Dfl. 310.00, US\$ 198.00, £ 120.00. — Kluwer Academic Publishers, Dordrecht, 1992.

This volume provides a comprehensive review of the state-of-the-art in topology design, spanning fundamental mathematical, mechanical and implementation issues. The formulations and solution of discrete design problems are described, including new applications of genetic algorithms and dual methods. For continuum problems the emphasis is on the “homogenization method”, which employs composite materials as the basis for defining shape in terms of material density, unifying macroscopic structural design optimization and micromechanics. All aspects of this field are covered, including computational aspects and the homogenization method in a computer-aided design environment.

David B.A. EPSTEIN with James W. CANNON, Derek F. HOLT, Silvio V.F. LEVY, Michael S. PATERSON, William P. THURSTON. — **Word processing in groups.** — Un vol. relié,  $16 \times 23$ , de XI, 330 p. — Prix: US\$ 29.95. — Jones and Bartlett Publishers, Boston, distributed by A.K. Peters, Ltd, Wellesley MA, 1992.



Using finite state automata, the authors have created the new theory of automatic groups, a branch of combinatorial group theory (the study of groups through generators and relations). This book is the first to develop this new theory, and even before publication it had already been widely cited in research articles by other mathematicians. The book also contains a readable introduction to the theory of regular languages, a discussion of related topics in combinatorial group theory, and connections between automatic groups and geometry, connections which largely motivated the development of the new theory. The first part of the book can be used as the basis for a graduate or advanced undergraduate course. Later chapters present research problems.

Wolfgang BOEHM and Hartmut PRAUTZSCH. — **Numerical methods.** — Un vol. broché, 16 × 23, de x, 186 p. — Prix: DM 58.00, US\$39.00. — Vieweg Publishing, Braunschweig, Wiesbaden, distributed in the USA and Canada by A.K. Peters, Wellesley MA, 1993.

This book provides an introduction to methods of numerical analysis. Of principal concern in writing this book was to expose fundamental ideas of algorithms for solution of widely varied mathematical problems. To encourage the programming of the methods explicit algorithms are given throughout. For better understanding the algorithms are always presented in a pseudo code. Simple examples further illustrate the methods.

Semen Grigor'evich GINDIKIN, Leonid Romanovich VOLEVICH. — **The method of Newton's polyhedron in the theory of partial differential equations.** — Mathematics and its applications (Soviet series), vol. 86. — Un vol. relié, de x, 266 p. — Prix: Dfl. 195.00, US\$126.00, £69.00. — Kluwer Academic Publishers, Dordrecht, 1992.

This volume develops the method of Newton's polyhedron for solving some problems in the theory of partial differential equations. The content is divided into two parts. Chapters 1-4 consider Newton's polygon and chapters 5-7 consider Newton's polyhedron. The case of the polygon makes it possible not only to consider general constructions in the two-dimensional case, but also leads to some natural multidimensional applications. Attention is mainly focused on a special class of hypoelliptic operators defined using Newton's polyhedron, energy estimates in Cauchy's problem relating to Newton's polyhedron, and generalized operators of principal type. Priority is given to the presentation of an algebraic technique which can be applied to many other problems as well.

N. BELLOMO, Z. BRZEZNIAK and L.M. de SOCIO. — **Nonlinear stochastic evolution problems in applied sciences.** — Mathematics and its applications, vol. 82. — Un vol. relié, 16,5 × 24,5, de xiv, 219 p. — Prix: Dfl. 145.00, US\$93.50, £52.00. — Kluwer Academic Publishers, Dordrecht, 1992.

This volume deals with the analysis of nonlinear evolution problems described by partial differential equations having random or stochastic parameters. The emphasis throughout is on the actual determination of solutions, rather than on proving the existence of solutions, although mathematical proofs are given when this is necessary from an applications point of view. — Contents: Stochastic models and random evolution equations. Deterministic systems with random initial conditions. The random initial boundary value problem. Stochastic systems with additional weighted noise. Time evolution of the probability density. Some further developments of the SAI method.

Yu.A. MITROPOLSKY, A.M. SAMOILENKO and D.I. MARTINYUK. — **Systems of evolution equations with periodic and quasiperiodic coefficients.** — Mathematics and its applications (Soviet series), vol. 87. — Un vol. relié, 16,5 × 24,5, de xiv, 280 p. — Prix: Dfl. 195.00, US\$126.00, £69.00. — Kluwer Academic Publishers, Dordrecht, 1993.

Many problems in celestial mechanics, physics and engineering involve the study of oscillating systems governed by nonlinear ordinary differential equations or partial differential equations. This volume represents a contribution to the available methods of solution for such systems. — Contents: Numerical-analytic method of investigation of periodic solutions for systems with aftereffect. Investigation of periodic solutions of systems with aftereffect by Bubnov-Galerkin's method. Quasiperiodic solutions of systems with lag, Bubnov-Galerkins method. Existence of invariant toroidal manifolds for systems with lag, investigation of the behavior of trajectories in their vicinities. Reducibility of linear systems of difference equations with quasiperiodic coefficients. Invariant toroidal sets for systems of difference equations, investigation of the behavior of trajectories on toroidal sets and in their vicinities.

Henry ROUANET, Brigitte LE ROUX. — **Analyse des données multidimensionnelles: statistique en sciences humaines.** — Un vol. broché, 15,5 × 24, de x, 309 p. — Prix: FF 145.00. — Dunod, Paris, 1993.

Ce manuel reprend, pour l'essentiel, les enseignements d'analyse de données dispensés à l'Université René Descartes: MST d'informatique et statistiques appliquées aux Sciences humaines, Maîtrise MASS, DESS de psychologie du travail. Consacré aux données multidimensionnelles, l'ouvrage s'adresse, au-delà des étudiants et enseignants des cursus mentionnés, à tous les chercheurs et utilisateurs concernés par l'analyse des données. L'ouvrage contient une nouvelle rubrique: «Bases mathématiques», qui présente les éléments indispensables de l'algèbre linéaire.

Bernhard AMBERG, Silvana FRANCIOSI, and Francesco DE GIOVANNI. — **Products of groups.** — Oxford mathematical monographs. — Oxford science publications. — Un vol. relié, 16 × 24, de XII, 220 p. — Prix: £45.00. — Clarendon Press, Oxford, 1992.

This monograph gives the first detailed account of the most important results that have been found about the groups that are the product of two subgroups. Although the emphasis is on infinite groups, some relevant theorems about finite products of groups are also proved. Also included is a special chapter on conjugacy and splitting theorems obtained by means of the cohomology of groups which has never appeared in book form before. — Contents: Elementary properties of factorized groups. Products of nilpotent groups. Products of periodic groups. Products of groups of finite rank. Splitting and conjugacy theorems. Triply factorized groups. Some further topics.

**Discrete and computational geometry: papers from the DIMACS special year.** — Edited by Jacob E. Goodman, Richard Pollack, William Steiger. — DIMACS: Series in discrete mathematics and theoretical computer science, vol. 6. — Un vol. relié, 18 × 26, de x, 378 p. — Prix: £43.00. — American Mathematical Society, Providence R.I. and Association for Computing Machinery, Baltimore, distributed by Oxford University Press, Oxford, 1991.

The first DIMACS special year, held during 1989-1990, was devoted to discrete and computational geometry. The workshops addressed the following topics: geometric complexity, probabilistic methods in discrete and computational geometry, polytopes and convex sets, arrangements, and algebraic and practical issues in geometric computation. This volume presents results of the workshops and the special year activities. Containing both surveys articles and research papers, this collection presents an overview of significant recent progress in discrete and computational geometry.

Andreas DEFANT, Klaus FLORET. — **Tensor norms and operator ideals.** — North-Holland mathematics studies, vol. 176. — Un vol. relié,  $17 \times 25$ , de XI, 566 p. — Prix: Dfl. 240.00, US\$150.00. — North-Holland, Amsterdam, 1993.

The three chapters of this book are entitled Basic Concepts, Tensor Norms, and Special Topics. The first may serve as part of an introductory course in functional analysis since it shows the powerful use of the projective and injective tensor norms, as well as the basics of the theory of operator ideals. The second chapter is the main part of the book: it presents the theory of tensor norms as designed by Grothendieck in the “Résumé” and deals with the relation between tensor norms and operator ideals. The last chapter deals with special questions. Each section is accompanied by a series of exercises.

**Approximation theory.** — Edited by J. Szabados and K. Tandori. — Colloquia mathematica Societatis Janos Bolyai, vol. 58. — Un vol. relié,  $17,5 \times 24,5$ , de 798 p. — Prix: Dfl. 430.00, US\$245.50. — North-Holland, Amsterdam, 1991.

The Janos Bolyai Mathematical Society organized a Conference on Approximation Theory in Kecskemet, August 6 to 11, 1990. Most of the 53 papers in this volume deal with subjects of current interest in approximation theory, such as orthogonal polynomials, interpolation, Fourier series, splines, and polynomial approximations. Except for two survey papers, all of them represent original research with full proofs not published elsewhere in any form.

R. LIDL, G.L. MULLEN, and G. TURNWALD. — **Dickson polynomials.** — Pitman monographs and surveys in pure and applied mathematics, vol. 65. — Un vol. relié,  $16,5 \times 24$ , de 207 p. — Prix: £36.00. — Longman Scientific & Technical, Harlow, Essex, 1993.

This book provides a comprehensive up-to-date collection of results concerning Dickson polynomials and presents several applications. It also treats generalizations to polynomials in several variables and related rational function like Rédei functions. Each of the seven chapters includes exercises and notes. Tables of Dickson polynomials are given in the Appendix. For most parts of the text only the basic theory of groups, rings and fields is required. The book may serve as a reference text for graduate students or researchers interested in algebraic or number theoretic aspects of polynomials and for cryptologists.

N.E. WEGGE-OLSEN. —  **$K$ -theory and  $C^*$ -algebras: a friendly approach.** — Oxford science publication. — Un vol. relié,  $16,5 \times 24$ , de XII, 370 p. — Prix: £35.00. — Oxford University Press, Oxford, 1993.

$K$ -theory is often considered a complicated “specialist’s theory”. This book is an introduction to the basics and provides detailed explanation of the various concepts required for a deeper understanding of the subject. Some familiarity with basic  $C^*$ -algebra theory is assumed and then follows a careful construction and analysis of the operator  $K$ -theory groups and proof of the results of  $K$ -theory, including Bott periodicity. Since the book also aims to give full instruction, no details are left out in the presentation, and many instructive and generously hinted exercises are provided.

**Möbius and his band: mathematics and astronomy in nineteenth-century Germany.** — Edited by John Fauvel, Raymond Flood and Robin Wilson. — Un vol. relié,  $20 \times 25,5$ , de 172 p. — Prix: £19.50. — Oxford University Press, Oxford, 1993.

Most people have heard of the Möbius band. But the work and influence of August Möbius are more far-reaching than a topological toy. For some fifty years of the nineteenth century he



taught astronomy and researched in mathematics at Leipzig University. During those years, which saw the German nation move towards unification, German mathematics developed into the most powerful and influential in the world and German astronomers became the world leaders. In this richly illustrated, and accessible book, leading scholars assess the contribution of Möbius and others of his time to the practice of mathematics and astronomy today.

D.A. HOLTON, J. SHEEHAN. — **The Petersen graph.** — Australian Mathematical Society lecture series, vol. 7. — Un vol. broché,  $15,5 \times 23$ , de 253 p. — Prix: £22.95. — Cambridge University Press, Cambridge, 1993.

The Petersen graph occupies an important position in the development of several areas of modern graph theory because it often appears as a counter-example to important conjectures. In this account the authors examine those areas, using the prominent role of the Petersen graph as a unifying feature. Topics covered include: vertex and edge colourability (including snarks), factors, flows, projective geometry, cages, hypohamiltonian graphs, and “symmetry” properties such as distance transitivity. The final chapters contains a pot-pourri of other topics in which the Petersen graph has played its part.

Igor E. SHPARLINSKI. — **Computational and algorithmic problems in finite fields.** — Mathematics and its applications (Soviet series), vol. 88. — Un vol. relié,  $17 \times 24,5$ , de XII, 240 p. — Prix: Dfl. 175.00, US\$ 118.00, £ 70.00. — Kluwer Academic Publishers, Dordrecht, 1992.

This volume presents an exhaustive treatment of computation and algorithms for finite fields. Topics covered include polynomial factorization, finding irreducible and primitive polynomials, distribution of these primitive polynomials and of primitive points on elliptic curves, constructing bases of various types and new applications of finite fields to other areas of mathematics. For completeness, also included are special chapters on some recent advances and applications of the theory of congruences, and computational number theory. The level of discussion presupposes only a knowledge of the basic facts of finite fields.

Wilfrid HODGES. — **Model theory.** — Encyclopedia of mathematics and its applications, vol. 42. — Un vol. relié,  $16,5 \times 24$ , de XIII, 772 p. — Prix: £65.00, US\$99.95. — Cambridge University Press, Cambridge, 1993.

This is an up-to-date and integrated introduction to model theory, designed to be used for graduate courses (for students who are familiar with first order logic), and as a reference for more experienced logicians and mathematicians. Model theory is concerned with the notions of definition, interpretation and structure in a very general setting, and is applied to a wide variety of other areas such as set theory, geometry, algebra (in particular group theory), and computer science (e.g. logic programming and specification). The author emphasis definability and methods of construction, and introduces the reader to advanced topics such as stability

N. Ja. VILENKIN and A.U. KLIMYK. — **Representation of Lie groups and special functions. Vol. 2: Class I representations, special functions, and integral transforms.** — Mathematics and its applications (Soviet series), vol. 74. — Un vol. relié,  $16,5 \times 25$ , de XVIII, 607 p. — Prix: Dfl. 460.00, US\$290.00, £183.00. — Kluwer Academic Publishers, Dordrecht, 1993.

This volume deals with the properties of special functions and orthogonal polynomials (Legendre, Gegenbauer, Jacobi, Laguerre, Bessel and others) which are related to the class 1 representations of various groups. The tree method for the construction of bases for representation spaces is given. “Continuous” bases in the spaces of functions on hyperboloids and cones

and corresponding Poisson kernels are found. Also considered are the properties of the  $q$ -analogs of classical orthogonal polynomials, related to representations of the Chevalley groups, and of special functions connected with fields of  $p$ -adic numbers. This volume will be of interest to specialists in group representations, special functions, differential equations with partial derivatives and harmonic analysis.

**Several complex variables.** — Proceedings of the Mittag-Leffler Institute, 1987-1988. — Edited by John Erik Fornaess. — Mathematical notes, vol. 38. — Un vol. broché,  $16,5 \times 23,5$ , de 701 p. — Prix: US\$39.50, £27.50. — Princeton University Press, Princeton NJ, 1993.

During the academic year 1987/88 there was a special year devoted to several complex variables at the Mittag-Leffler Institute in Stockholm, Sweden. These Proceedings consist of 38 papers written by some of the participants. The mathematical organizers were Christer Kieselmann and John E. Fornaess, and Dan Laksov served as Institute Director.

James EELLS and Andrea RATTO. — **Harmonic maps and minimal immersions with symmetries: methods of ordinary differential equations applied to elliptic variational problems.** — Annals of mathematics studies, vol. 130. — Un vol. broché, de  $15,5 \times 23,5$ , de 228 p. — Prix: US\$19.95, (relié: US\$49.50). — Princeton University Press, Princeton NJ, 1993.

From the introduction: “In this monograph we study harmonic maps, minimal and parallel mean curvature immersions in various symmetric contexts. The maps under consideration are solutions to certain elliptic variational problems; and in the presence of suitable symmetry, those often admit reductions to lower dimensional problems whose qualitative study is more manageable”. — Contents: Basic variational and geometrical properties.  $G$ -invariant minimal and constant mean curvature immersions. Harmonic maps between spheres.

Amir DEMBO, Ofer ZEITOUNI. — **Large deviations techniques and applications.** — Jones and Bartlett books in mathematics. — Un vol. relié, de  $16 \times 23,5$ , de XIII, 346 p. — Prix: US\$44.50. — Jones and Bartlett Publishers, Boston, distributed by A.K. Peters, Ltd., Wellesley MA, 1993.

From the preface: “In recent years, there has been renewed interest in the (old) topic of large deviations, namely, the asymptotic computation of small probabilities on an exponential scale... The reasons for this interest are twofold. On the one hand, starting with Donsker and Varadhan, a general foundation was laid that allowed one to point out several “general” tricks that seem to work in diverse situations. On the other hand, large deviations estimates have proved to be the crucial tool required to handle many questions in statistics, engineering, statistical mechanics, and applied probability”. — Contents: Introduction. LDP for finite dimensional spaces. Applications-the finite dimensional case. General principles. Sample path large deviations. The LDP for abstract empirical measures. Applications of empirical measures LDP.

Giorgio LETTA. — **Probabilità elementare.** — Compendio di teoria-problemi risolti. — Un vol. broché,  $17 \times 24$ , de XII, 308 p. — Prix: L. 28000.00. — Zanichelli, Bologna, 1993.

Il presente libro intende fornire una breve ma rigorosa introduzione al calcolo delle probabilità classico. Esso vuol porre soltanto le basi per successivi sviluppi: perciò, più che presentare una rassegna di risultati specifici, intende fornire al lettore una sicura padronanza dei concetti e degli strumenti fondamentali destinati a intervenire in ogni problema particolare

di probabilità. Il volume consta di due parti distinte, ma tra loro intimamente collegate: un compendio di teoria e una raccolta di problemi. Si tratta di problemi assegnati dall'autore come prove d'esame in un corso rivolto agli studenti di Scienze dell'informazione.

Olavi NEVANLINNA. — **Convergence of iterations for linear equations.** — Lectures in mathematics ETH Zürich. — Un vol. broché,  $17 \times 24$ , de VII, 177 p. — Prix: SFr. 36.00. — Birkhäuser, Basel, 1993.

The book discusses the convergence of Krylov subspace methods for solving fixed point problems, and focuses on the dynamical aspects of the iteration processes. For example, there are many similarities between the evolution of a Krylov subspace process and that of linear operator semigroups, in particular in the beginning of the iteration. A lifespan of an iteration might typically start with a fast but slowing phase. Such a behavior is sublinear in nature, and is essentially independent of whether the problem is singular or not. Then, for nonsingular problems, the iteration might run with a linear speed before a possible superlinear phase. All these phases are based on different mathematical mechanisms which the book outlines.

**Discrete event systems: modeling and control.** — Proceedings of a joint Workshop held in Prague, August 1992. — Edited by S. Balemi, P. Kozak, R. Smedinga. — Progress in systems and control theory, vol. 13. — Un vol. relié,  $16 \times 24$ , de VI, 230 p. — Prix: SFr. 88.00. — Birkhäuser, Basel, 1993.

This book contains a collection of papers in the area of discrete event systems control. Research in this area is strongly motivated by applications in flexible manufacturing, communications, database management, traffic control, and concurrent and real-time software verification and design. The papers were presented at the Joint Workshop on Discrete Event Systems (WODES'92) held in Prague, Czechoslovakia, on August 26-28, 1992. They reflect four directions of current research: models of real-time system behaviour, methods for decreasing computation and model complexity, unifying approaches to modeling, and new results in performance analysis and optimization of discrete event systems.

René DEHEUVELS. — **Tenseurs et spineurs. Collection Mathématiques.** — Un vol. broché,  $15 \times 22$ , de 536 p. — Prix: FF 395.00. — Presses universitaires de France, Paris, 1993.

Ce livre détaille et justifie la structure algébrique des tenseurs, des spineurs, des connexions et de la dérivation covariante, en illustrant leur maniement par de très nombreux exemples: calcul extérieur, géométries riemannienne et symplectique, tenseurs de courbure, relativité restreinte et générale, équations de Maxwell et d'Einstein, invariants des algèbres de Lie, etc.

Peter H. SELBY, Steve SLAVIN. — **Quick algebra review : a self-teaching guide.** — Second edition. — Un vol. broché,  $18 \times 25,5$ , de VI, 232 p. — Prix: £9.95. — John Wiley & Sons, Chichester, 1993.

The volume is intended primarily as refresher for those who have completed the Wiley Self-teaching guide "Practical Algebra". Questions, answers, review problems, and quizzes help you to test your progress every step of the way. — Contents: Some basic concepts. The number system. Monomials and polynomials. Special products and factoring. Fractions. Exponents, roots, and radicals. Linear and fractional equations and formulas. Functions and graphs. Quadratic equations. Inequalities. Ratio, proportion, and variation. Solving everyday problems.

Lawrence CONLON. — **Differentiable manifolds: a first course.** — Birkhäuser advanced texts. Basler Lehrbücher. — Un vol. relié, 17,5 × 25, de XII, 395 p. — Prix: SFr. 88.00. — Birkhäuser, Boston, 1993.

Among the basic themes emphasized by the author is the role of differentiation as a process of linear approximation to nonlinear problems. The well understood methods of linear algebra are applied to the resulting linear problems and, where possible, the results are reinterpreted in terms of the original nonlinear problem. Another theme is the process of solving differential equations (i.e., integration) as the reverse of differentiation. It reassembles an infinite array of linear approximations, resulting from differentiation, into the original nonlinear data. Another theme is the contrast and interaction between local and global calculus. The local theory is characterized by explicit computations in fixed coordinate systems, while topology is an essential feature of the global theory. These themes of linearization, (re)integration, and global versus local are emphasized repeatedly and mold the character of the book.

Neal MADRAS, Gordon SLADE. — **The self-avoiding walk.** — Probability and its applications. — Un vol. relié, 16 × 24, de XIV, 423 p. — Prix: SFr. 108.00. — Birkhäuser, Boston, 1993.

This book provides the first unified account of the rigorous results for the self-avoiding walk, with particular emphasis on its critical behaviour. It is self-contained and accessible to beginning graduate students. Topics include: the lace expansion and its application to the self-avoiding walk in more than four dimensions, where most issues are now resolved; an introduction to the nonrigorous scaling theory; classical work of Hammersley and others; a new exposition of Kesten's pattern theorem and its consequences; a discussion of the decay of the two-point function and its relation to probabilistic renewal theory; analysis of Monte Carlo methods that have been used to study the self avoiding walk; the role of the self-avoiding walk in physics and chemistry.

Howard KARLOFF. — **Linear programming.** — Progress in theoretical computer science. — Un vol. relié, 16 × 24, de VIII, 142 p. — Prix: SFr. 74.00. — Birkhäuser, Boston, 1993.

This book is a concise, thorough, mathematical introduction to the theory of linear programming, viewed as a study of algorithms. Requiring nothing more than basic linear algebra for comprehension, it presents rigorous and lucid expositions of such topics as the simplex algorithm, the ellipsoid algorithm, and Karmarkar's algorithm. It provides for the practitioner a blend of rigor, intuition, and motivation for understanding the theory and applying it to such topics as game theory and algorithm design. A distinctive feature of the book is a detailed proof of the polynomiality of running time for Karmarkar's algorithm and the ellipsoid algorithm. Another is its computer science perspective, which addresses the issue of computational complexity with great care.

Kung-ching CHANG. — **Infinite dimensional Morse theory and multiple solution problems.** — Progress in nonlinear differential equations and their applications, vol. 6. — Un vol. relié, 16 × 24, de X, 312 p. — Prix: SFr. 118.00. — Birkhäuser, Boston, 1993.

In this first book to discuss various critical point theorems in a unified framework, the author treats Morse theory as a tool to study multiple solutions to differential equations arising in the calculus of variations. Critical groups for isolated critical points or orbits — which provide more information than the Leray-Schauder index — are introduced. Topics covered include basic Morse theory and its various extensions; minimax principles in Morse theory; and

applications of semilinear boundary value problems, periodic solutions of Hamiltonian systems, and harmonic maps. In a self-contained appendix, the author presents Witten's proof of Morse inequalities.

Pierre-Louis CURIEN. — **Categorical combinators, sequential algorithms, and functional programming.** — Second Edition. — Progress in theoretical computer science. — Un vol. relié, 16 × 24, de xx, 403 p. — Prix: SFr. 118.00. — Birkhäuser, Boston, 1993.

This book is a thoroughly revised edition of a monograph that presents an approach to the design and implementation of sequential programming languages based on the relationship between lambda-calculus and category theory. The foundations of a new "categorical" combinatory logic are laid down. A simple abstract machine, called the Categorical Abstract Machine is presented. A mathematical semantics of sequentiality is proposed, in which "sequential algorithms" rather than functions are used to interpret procedures. The theoretical investigation has led to the development of a programming language, CDSO, in which basic and functional types are not differentiated.

Alistair SINCLAIR. — **Algorithms for random generation and counting: a Markov chain approach.** — Progress in theoretical computer science. — Un vol. relié, 16 × 24, de 146 p. — Prix: SFr. 78.00. — Birkhäuser, Boston, 1993.

This book studies two classical computational problems: counting the elements of a finite set of combinatorial structures, and generating them at random from some probability distribution. The author aims to classify the computational difficulty of these problems for various naturally occurring structures. The emphasis is on positive results that demonstrate the existence of efficient algorithms. At the heart of the monograph is a single algorithmic paradigm: simulate a Markov chain whose states are combinatorial structures.

**Quo vadis, graph theory?: a source book for challenges and directions.** — Edited by John Gimbel, John W. Kennedy and Louis V. Quintas. — Annals of discrete mathematics, vol. 55. — Un vol. relié, 17 × 24,5, de VIII, 397 p. — Prix: US\$ 128.50, Dfl. 225.00. — North-Holland, Amsterdam, 1993.

The idea for this volume originated together with that for an international discussion meeting, also under the title "Quo Vadis, Graph Theory?" held at the University of Alaska, Fairbanks in August of 1990. This volume is not a proceedings of that meeting; rather, it is a collection of papers written with the discussions of that meeting as background. The first three papers in the volume are special in that they provide the reader with complementary perspectives on the future of graph theory in general. "Whither Graph Theory?" by W.T. Tutte and "The future of graph theory" by B. Bollobás each take a philosophical approach. "New directions in graph theory" by F.S. Roberts offers a comprehensive overview of questions and developments in the subject with an emphasis on applications...

**Einstein metrics and Yang-Mills connections.** — Proceedings of the 27th Taniguchi International Symposium. — Edited by Toshiki Mabuchi, Shigeru Mukai. — Lecture notes in pure and applied mathematics, vol. 145. — Un vol. broché, 18 × 25,5, de VIII, 224 p. — Prix: US\$ 99.75. — Marcel Dekker, New York, 1993.

This volume contains papers focusing on the study of moduli spaces of various geometric objects such as Einstein metrics, conformal structures, and Yang-Mills connections from algebraic and analytic points of view. The authors discuss current topics in Kähler geometry, including Kähler-Einstein metrics, Hermitian-Einstein connections, and a new Kähler version



of Kawamata-Viehweg's vanishing theorem... explore algebraic geometric treatments of holomorphic vector bundles on curves and surfaces... address nonlinear problems related to Monge-Ampère and Yamabe-type equations as well as nonlinear equations in mathematical physics... cover interdisciplinary topics such as twistor theory, magnetic monopoles, *KP*-equations, Einstein and Gibbons-Hawking metrics, supercommutative algebras of superdifferential operators, etc.

Gregory KARPILOVSKY. — **Group representations, vol 2.** — North-Holland mathematics studies, vol. 177. — Un vol. relié,  $16,5 \times 24,5$ , de xv, 902 p. — Prix: US\$ 185.75, Dfl. 325.00. — North-Holland, Amsterdam, 1993.

The principal object of the volume is to provide, in a self-contained manner, a comprehensive coverage of projective representations and the Schur multiplier. The book is a compilation and synthesis of a large body of work, done over several decades. — Contents: Projective representations I: Second cohomology groups. Twisted group algebras. Introduction to projective representations. Covering groups. Degrees of irreducible representations. Counting irreducible representations. Reduction to smaller groups. — The Schur multiplier: Operator groups and bilinear forms. Free groups, homology and resolutions. Generalities. Schur's formula and applications. Symmetric and alternating groups. Schur multipliers of  $p$ -groups. Cohomological  $F$ -functors. Wreath products. Linear groups. Some simple groups. Schur multipliers and orthogonal modules. Finite Coxeter groups.

John ROE. — **Elementary geometry.** — Oxford science publications. — Un vol. broché,  $16 \times 24,5$ , de ix, 307 p. — Prix: £18.50. — Oxford University Press, Oxford, 1993.

The geometry of two- and three-dimensional space has long been studied for its own sake, but its results also underlie modern developments in fields as diverse as linear algebra, quantum physics, and number theory. This text is a careful introduction to Euclidean geometry that emphasizes its connections with other subjects. Glimpses of more advanced topics in pure mathematics are balanced by a straightforward treatment of the geometry needed for mechanics and classical applied mathematics. The exposition is based on vector methods; an introductory chapter relates these methods to the more classical axiomatic approach.

Jean HLADIK. — **Le calcul tensoriel en physique.** — Enseignement de la physique, mathématiques pour la physique. — Un vol. broché,  $16 \times 24$ , de xvi, 172 p. — Prix: FF 160.00. — Masson, Paris, 1993.

Principalement destiné aux physiciens, cet ouvrage expose, de manière simple et précise, la technique du calcul tensoriel et ses applications à la physique. Cet ouvrage rappelle tout d'abord les notions essentielles sur les vecteurs avant d'introduire, de manière progressive et à l'aide d'exemples, la notion de tenseur. Il traite ensuite de l'algèbre et de l'analyse tensorielles ainsi que les différents espaces associés: espace ponctuel, espace dual, espaces de Riemann. Une dernière partie est consacrée aux applications des tenseurs dans de nombreux domaines de la physique: mécanique du solide et des milieux continus, électromagnétisme, relativité, mécanique quantique, gravitation et cosmologie.

Brian STRAUGHAN. — **Mathematical aspects of penetrative convection.** — Pitman research notes in mathematics series, vol. 288. — Un vol. relié,  $17 \times 24,5$ , de xi, 120 p. — Prix: US\$20.00. — Longman Scientific and Technical, Harlow, Essex, 1993.

This research note summarizes recent developments in models for penetrative convection. Two aspects are concentrated on. The first is a study of continuous dependence on various

parameters in a general setting. This aspect also focuses on improperly posed problems. The second investigates nonlinear stability of specific practical problems such as convection driven by radiation, or variable viscosity convection.

**Advances in number theory.** — The proceedings of the Third Conference of the Canadian Number Theory Association, August 18-24, 1991, the Queen's University at Kingston. — Ed. by Fernando Q. Gouvea and Noriko Yui, in consultation with A. Granville, R. Gupta, E. Kani, H. Kisilevsky, R. Mollin, and C. Stewart. — Oxford science publications. — Un vol. relié, 16,5 × 24, de xxiii, 534 p. — Prix: £50.00. — Clarendon Press, Oxford, 1993.

This book contains 38 articles of the Proceedings of the Third Conference of the Canadian Number Theory Association. The conference was partially dedicated to Paulo Ribenboim on the occasion of his retirement from Queen's University. There were 177 registered participants. The conference was divided into sessions focusing on specific areas: Analytic number theory, arithmetical algebraic geometry, and diophantine approximation. A special session was organized in honour of Paulo Ribenboim. The size of this volume is a testimony to the variety and interest of the material presented at the conference.

Christopher D. SOGGE. — **Fourier integrals in classical analysis.** — Cambridge tracts in mathematics, vol. 105. — Un vol. relié, 16 × 23,5, de x, 236 p. — Prix: £24.95, US\$39.95 — Cambridge University Press, Cambridge, 1993.

This is a monograph concerned with modern treatments of central problems in harmonic analysis. The main theme of the book is the interplay between ideas used to study the propagation of singularities for the wave equation and their counterparts in classical analysis. Using microlocal analysis, the author, in particular, studies problems involving maximal functions and Riesz means using the so-called half-wave operator. This self-contained book presents a rapid review of important topics in Fourier analysis, the necessary tools from microlocal analysis, a proof of the sharp Weyl formula... Finally, the book contains the regularity properties of Fourier integral operators, culminating in the proof of local smoothing estimates and their applications to singular maximal theorems in two and more dimensions.

Heinrich HUSSMANN. — **Nondeterminism in algebraic specifications and algebraic programs.** — Progress in theoretical computer science. — Un vol. relié, 16 × 24,5, de vii, 253 p. — Prix: SFr. 92.00. — Birkhäuser, Boston, 1993.

The book presents a mathematical theory for the integration of three concepts: non-determinism, axiomatic specification, and term rewriting. For nondeterministic programs, an algebraic specification language is provided, which admits the application of automated tools based on term rewriting techniques. This general framework is used to explore connections between logic programming and algebraic programming. Many examples from various areas of computer science are given, including results of computer experiments with a prototypical implementation.

A.M. ANILE, J.K. HUNTER, P.PANTANO and G. RUSSO. — **Ray methods for nonlinear waves in fluids and plasmas.** — Pitman monographs and surveys in pure and applied mathematics, vol. 57. — Un vol. relié, 16 × 24,5, de 243 p. — Prix: £39.00. — Longman Scientific Technical, Harlow, Essex, 1993.

This text provides a systematic description of ray methods for nonlinear waves, with detailed applications to waves in fluids and plasmas. The book is self-contained and begins with a concise introduction to the basic equations of fluid mechanics and to the ideas of asymptotic

analysis. This is followed by a derivation of generalized Burgers and Korteweg de Vries equations for multidimensional nonlinear hyperbolic waves, with applications to fluid and plasma waves. Special features of the book are extended descriptions of wavefront expansions for shock waves and of resonant interactions of weakly hyperbolic waves. Neither of these topics has been treated previously in an introductory text.

Samuel JOHSUA, Jean-Jacques DUPIN. — **Introduction à la didactique des sciences et des mathématiques.** — Collection premier cycle. — Un vol. broché,  $15 \times 22$  cm, de x, 422 p. — Prix: FF 128.00. — Presses Universitaires de France, Paris, 1993.

Les recherches en didactique des disciplines scientifiques se sont données pour but une étude systématique des phénomènes d'enseignement dans ces domaines, visant à délimiter un champ des possibles pour l'amélioration de l'éducation scientifique. Le présent ouvrage fait le point des résultats atteints dans cette perspective. Ouvert par deux chapitres de cadrage concernant l'épistémologie des sciences et la psychologie cognitive, il présente et discute les concepts, les problématiques et les méthodes essentiels de la didactique des sciences et des mathématiques. Ce manuel traite d'une manière synthétique à la fois les diverses disciplines correspondantes et l'ensemble des niveaux d'enseignement, ainsi que des travaux portant sur des exemples précis et variés.

Philip FEINSILVER, René SCHOTT. — **Algebraic structures and operator calculus, vol. 1: representations and probability theory.** — Mathematics and its applications, vol. 241. — Un vol. relié, de  $16,5 \times 25$ , de ix, 223 p. — Prix: Dfl. 150.00, US\$93.50, £61.50. — Kluwer Academic Publishers, Dordrecht, 1993.

This is the first of three volumes which present, in an original way, some of the most important tools of applied mathematics, in areas such as probability theory, operator calculus, representation theory... Volume I deals with probability theory in connection with group representations. This book presents an introduction to Lie algebras and Lie groups which emphasises the connections with probability theory and representation theory. The book contains an introduction and seven chapters which treat respectively, noncommutative algebra, hypergeometric functions, probability and Fock spaces, moment systems, Bernoulli processes/systems, and matrix elements.

Jan-Erik BJOERK. — **Analytic  $D$ -modules and applications.** — Mathematics and its applications, vol. 247. — Un vol. relié,  $17 \times 25$ , de xiii, 581 p. — Prix: Dfl. 395.00, US\$245.00, £162.00. — Kluwer Academic Publishers, Dordrecht, 1993.

This is the first monograph to be published on analytic  $D$ -modules. This book studies holomorphic differential systems on complex manifolds. It brings new insight and methods into many areas, such as infinite dimensional representations of Lie groups, asymptotic expansions of hypergeometric functions, intersection cohomology on Kaehler manifolds and the calculus of residues in several complex variables. The book contains seven chapters and has an extensive appendix which is devoted to the most important tools which are used in  $D$ -module theory. This includes an account of sheaf theory in the context of derived categories, a detailed study of filtered non-commutative rings and homological algebra, and the basic material on symplectic geometry and stratifications on complex analytic sets.

A.G. PINUS. — **Boolean constructions in universal algebras.** — Mathematics and its applications, vol. 242. — Un vol. relié,  $16,5 \times 24,5$ , de vii, 350 p. — Prix: Dfl. 240.00, US\$149.00, £98.00. — Kluwer Academic Publishers, Dordrecht, 1993.



During the last few decades the ideas, methods and results of the theory of Boolean algebras have played an increasing role in various branches of mathematics and cybernetics. This monograph is devoted to the fundamentals of the theory of Boolean constructions in universal algebra. Also considered are the problems of presenting different varieties of universal algebras with these constructions, and applications for investigating the spectra and skeletons of varieties of universal algebras.

**Algebras and orders.** — Proceedings of the NATO Advanced Study Institute and Séminaire de mathématiques supérieures, Montréal, Canada, July 29 — August 9, 1991. — Edited by Ivo G. Rosenberg and Gert Sabidussi. — NATO ASI Series, series C: Mathematical and physical sciences, vol. 389. — Un vol. relié, 16,5 × 24,5, de xvii, 553 p. — Prix: Dfl. 365.00, US\$220.00, £148.00. — Kluwer Academic Publishers, Dordrecht, 1993.

The lectures cover a broad spectrum of topics in universal algebra, Boolean algebras, lattices and orders, and their links with graphs, relations, topology and theoretical computer science. — Contents: W. Taylor: Abstract clone theory. — D. Schweigert: Hyperidentities. — A. Pixley: Functional and affine completeness and arithmetical varieties. — B. Jonsson: A survey of Boolean algebras with operators. — B. Davey: Duality theory on ten dollars a day. — P. Burmeister: Partial algebras, an introductory survey. — R. Freese: Lectures on free lattices. — M. Ern : Algebraic ordered sets and their generalizations. — I. Rival: Reading, drawing, and order. — H. Machida, I.G. Rosenberg: Essentially minimal groupoids. — I. Fleischer: A Boolean formalization of predicate calculus.

Sundaram THANGAVELU. — **Lectures on Hermite and Laguerre expansions.** — Mathematical notes, vol. 42. — Un vol. broch , 15,5 × 23,5, de xv, 195 p. — Prix: US\$22.50. — Princeton University Press, Princeton, 1993.

From the preface: “The Hermite functions arise naturally as the eigenfunctions of the harmonic oscillator Hamiltonian, and so play a vital role in quantum physics. They are also the eigenfunctions of the Fourier transform... Multiple ( $n$ -dimensional) Hermite functions are defined simply by taking the tensor product of the one-dimensional Hermite functions... The Laguerre polynomials may be regarded as generalizations of the Hermite polynomials in the sense that Laguerre polynomials of order  $-1/2$  give the Hermite polynomials of even degree and those of order  $1/2$  give the Hermite polynomials of odd degree...”. This book contains 7 chapters: Hermite, special Hermite and Laguerre functions. Special Hermite expansions. Multiple Hermite expansions. Multipliers for Hermite expansions. Hermite expansions on  $\mathbb{R}$ . Laguerre expansions. The transplantation theorems.

Michio KUGA. — **Galois’ dream: group theory and differential equations.** — Susan Addington, Motohico Mulase translators. — Un vol. broch , 18 × 26,5, de ix, 150 p. — Prix: SFr. 52.00. — Birkh user, Boston, 1993.

From the preface: “These are lecture notes for a course I gave at the University of Tokyo a few years ago... It is well known that group theory, at its inception, was deeply connected to algebraic equations. The success of the theory of Galois groups in algebraic equations led to the hope that similar group-theoretic methods could be a powerful arsenal to attack the problems of differential equations... In order to follow Lie’s original program, it would be necessary to use the ideas and techniques of modern analysis, such as the infinite dimensional Lie groups of E. Cartan and Kuranishi and the cohomology theory of D.C. Spencer... My lectures are on Fuchsian differential equations and their monodromy groups... If we restrict ourselves to only Fuchsian type differential equations, then the solutions are completely characterized by the monodromy group. This topic will be the main subject of this book.”

Nikolai V. IVANOV. — **Subgroups of Teichmüller modular groups.** — Translations of mathematical monographs, vol. 115. — Un vol. relié,  $18,5 \times 26$ , de XII, 127 p. — Prix: £73.50. — American Mathematical Society, Providence, distributed by Oxford University Press, Oxford, 1992.

Teichmüller modular groups, also known as mapping class groups of surfaces, serve as the meeting ground for several branches of mathematics, including low-dimensional topology, the theory of Teichmüller spaces, group theory, and, more recently, mathematical physics. The present work focuses mainly on the group-theoretic properties of these groups and their subgroups. The technical tools come from Thurston's theory of surfaces. The guiding principle of this investigation is a deep analogy between modular groups and linear groups. The main results include analogues for subgroups of modular groups of some of the central results of the theory of linear groups, namely, of theorems of Platonov, Tits, and Margulis-Soifer. The results also include a clear geometric picture of subgroups of modular groups and of their action on Thurston's boundary of Teichmüller space.

**Idempotent analysis.** — Edited by V.P. Maslov, S.N. Samborskii. — Advances in Soviet mathematics, vol. 13. — Un vol. relié,  $18,5 \times 26$ , de XI, 210 p. — Prix: £74.00. — American Mathematical Society, Providence, distributed by Oxford University Press, Oxford, 1992.

Idempotent analysis is a new branch of mathematical analysis which studies functional spaces and their mapping when the algebraic structure is generated by an idempotent operation. In classical analysis the main algebraic structure, the basic foundation that supports the stage on which the action is played out, is the structure of a field ( $\mathbb{R}$  or  $\mathbb{C}$ ). The articles of the present collection are united by their involvement with the properties of a mathematical object that has made its appearance only recently. The editors have in mind the analysis of "linear operators" in function spaces with values in an idempotent semiring.

**Abelian groups.** — Proceedings of the 1991 Curaçao Conference. — Edited by Laszlo Fuchs, Rüdiger Göbel. — Lecture notes in pure and applied mathematics, vol. 146. — Un vol. broché,  $18 \times 25,5$ , de x, 260 p. — Prix: US\$99.75. — Marcel Dekker, New York, 1993.

This volume — the only source for information offered at the international conference held in Curaçao Netherlands Antilles — presents the latest developments in the most active areas of abelian groups, particularly in torsion-free abelian groups. Providing guidance to both researches and graduate students with surveys that reflect the current status of Abelian group theory, Abelian groups discusses finite rank Butler groups... almost completely decomposable groups... Butler groups of infinite rank... equivalence theorems for torsion-free groups... cotorsion groups... endomorphism algebras... interactions of set theory and Abelian groups... etc.

**Number theory with an emphasis on the Markoff spectrum.** — Edited by Andrew D. Pollington, William Moran. — Lecture notes in pure and applied mathematics, vol. 147. — Un vol. broché,  $18 \times 25,5$ , de VIII, 321 p. — Prix: US\$125.00. — Marcel Dekker, New York, 1993.

Presenting the proceedings of a recently held conference in Provo, Utah, this reference provides original research articles in several different areas of number theory, highlighting the Markoff spectrum. Detailing the integration of geometric, algebraic, analytic, and arithmetic ideas, the book contains refereed contributions, written by over 30 authorities, on general problems of diophantine approximation... quadratic forms and their connections with automorphic forms... the modular group and its subgroups... continued fractions... hyperbolic geometry... the lower part of the Markoff spectrum... etc.

**Proceedings of the sixth SIAM Conference on Parallel Processing for Scientific Computing.**

— Edited by Richard. F. Sincovec, David E. Keyes, Michael R. Leuze, Linda R. Petzold, Daniel A. Reed. — SIAM Proceedings series. — 2 vol. brochés,  $18 \times 25,5$ , de xxxvii, 1040 p. — Prix: US\$95.00. — Society for Industrial and Applied Mathematics, Philadelphia, 1993.

This SIAM Conference held in Norfolk, Virginia, on March 22-24, 1993, focused on themes from the High Performance Computing and Communications (HPCC) program and, in particular, on grand challenge problems. The proceedings consists of two parts based on the conference themes: grand challenge problems or applications and support for grand challenge problems or infrastructure. Applications include computational fluid dynamics, geophysical modeling, materials science, molecular dynamics, and others. Papers in this proceedings highlight improvements in algorithm design and software technology that are essential to achieving sustained high levels of computing system performance. Other papers illustrate improvements in algorithms and software and their successful application to important problems. Finally, on parallel and distributed systems explore new opportunities and challenges for algorithms, software, and applications.

A.Ya. HELEMSKII. — **Banach and locally convex algebras.** — Translated by A. West. — Oxford science publications. — Un vol. relié,  $24 \times 16$ , de xv, 446 p. — Prix: £60.00. — Clarendon Press, Oxford, 1993.

This textbook summarizes the “algebra of analysis” that includes some mention of the contemporary trends in the development of history. This text provides an up-to-date account of Banach and locally convex algebras with emphasis on general theory, representations and homology. In its description of general theory and in the examples it considers it is faithful to earlier traditions in the subject but differs from those books in being based on an approach through homological algebra. — Contents: Foundations. — Initial concepts and first results. — Around the spectrum. — Basic stock of examples. — Commutative and star Banach algebras. — Polynormed algebras that are near to Banach algebras. — Modules, they are also representations. — Problems leading to homology and the elements of homology theory.

René CORI, Daniel LASCAR. — **Logique mathématique: cours et exercices.** — T. 1: Calcul propositionnel, algèbres de Boole, calcul de prédicat. — T. 2: Fonctions récursives, théorème de Gödel, théorie des ensembles, théorie des modèles. — Collection Axiome. — 2 vol. brochés,  $16 \times 24$ , de xv, 385 p. et xv, 347 p. — Prix: FF 290.00 (vol. 1), FF 260.00 (vol.2). — Masson, Paris, 1993.

Issu d'un enseignement de logique dispensé en 2<sup>e</sup> et 3<sup>e</sup> cycles, ce cours traite de manière détaillée des domaines fondamentaux de la logique mathématique. Le premier volume expose successivement le calcul propositionnel, les algèbres de Boole, le calcul des prédicats et les théorèmes de complétude. Le volume 2 est consacré aux problèmes de récursivité et de formalisation de l'arithmétique, aux théorèmes de Gödel et la théorie des ensembles ainsi qu'à la théorie des modèles. Les lecteurs y trouveront de nombreux exercices corrigés.

Peter DEUFLHARD, Andreas HOHMANN. — **Numerische Mathematik I: eine algorithmisch orientierte Einführung.** — 2., überarbeitete Auflage. — De Gruyter Lehrbuch. — Un vol. broché,  $23 \times 16$ , de xv, 371 p. — Prix: DM 46.00. — Walter de Gruyter, Berlin, 1993.

Dieser Band führt ein in die algorithmisch orientierte Numerische Mathematik als Teil des noch jungen interdisziplinären Gebietes Scientific Computing (Wissenschaftliches Rechnen). Nicht nur der Einsatz von immer leistungsfähigeren Computern, sondern auch Bereitstellung von effizienteren Algorithmen verschiebt heute die Komplexitätsgrenze lösbarer Probleme.

Dieser Entwicklung trägt das Buch in Stoffauswahl und Darstellungsweise Rechnung. Wesentliche Konzepte einer modernen Numerik werden am jeweils einfachsten Problemtyp behandelt. Ziel des Buches ist die Förderung des algorithmischen Denkens.

Ruilin LONG. — **Martingale spaces and inequalities.** — Un vol. relié,  $16 \times 23$ , de iv, 344 p. — Prix: DM 89.00, US\$ 64.00. — Vieweg Publishing, Wiesbaden, Braunschweig, 1993.

This book is intended to give a systematic introduction to the theory of martingale spaces and inequalities. Except those mainly concerned with the martingale  $H, p > 1$ , most parts of the book are the reflection of the developments in the field in the past twenty years (after the publication of Garsia's fundamental work "Martingale inequalities" in 1973). Topics covered include: regular martingales and atomic decomposition, some material related to BMO (Carleson measures, commutators, weights, martingale transforms, etc.), and some applications to analysis.

**Selected works of A.N. Kolmogorov, vol. III: Information theory and the theory of algorithms.** — Edited by A.N. Shirayev. — Mathematics and its applications, Soviet Series, vol. 27. — Un vol. relié,  $16,5 \times 25$ , de xxv, 275 p. — Prix: Dfl. 210.00, US\$ 132.00, £ 84.00. — Kluwer Academic Publishers, Dordrecht, 1993.

This volume is the last of three volumes devoted to the work of one of the most prominent twentieth-century mathematicians. Throughout his mathematical work, A.N. Kolmogorov (1903-1987) showed great creativity and versatility and his wide-ranging studies in many different areas led to the solution of conceptual and fundamental problems and the posing of new, important questions. His lasting contributions embrace probability theory and statistics, the theory of dynamical systems, mathematical logic, geometry and topology, the theory of functions and functional analysis, classical mechanics, the theory of turbulence and information theory. This volume contains original papers dealing with information theory and the theory of algorithms.

A.D. EGOROV, P.I. SOBOLEVSKY, L.A. YANOVICH. — **Functional integrals: approximate evaluation and applications.** — Mathematics and its applications, vol. 249. — Un vol. relié,  $16,5 \times 25$ , de x, 418 p. — Prix: Dfl. 295.00, US\$ 172.00, £ 122.00. — Kluwer Academic Publishers, Dordrecht, 1993.

Integration in infinite-dimensional spaces (continual integration) is a powerful mathematical tool which is widely used in a number of fields of modern mathematics, such as analysis, the theory of differential and integral equations, probability theory and the theory of random processes. This monograph is devoted to numerical approximation methods of continual integration. A systematic description is given of the approximate computation methods of functional integrals on a wide class of measures, including measures generated by homogeneous random processes with independent increments and Gaussian processes. Many applications to problems which originate from analysis, probability and quantum physics are presented.

B.E. BRODSKY and B.S. DARKHOVSKY. — **Nonparametric methods in change-point problems.** — Mathematics and its applications, vol. 243. — Un vol. relié,  $16,5 \times 25$ , de xi, 209 p. — Prix: Dfl. 145.00, US\$ 90.00, £ 59.50. — Kluwer Academic Publishers, Dordrecht, 1993.

This volume deals with nonparametric methods of change-point (disorder) detection in random processes and fields. The book has seven chapters: Chapter 1 presents an account of preliminary considerations. Chapter 2 reviews the current state-of-the-art. Chapter 3 and 4

consider a posteriori change-point problems and sequential change point detection problems, respectively. Chapter 5 discusses disorder detection of random fields, and Chapter 6 deals with applications in such diverse areas as geophysics, control systems and the analysis of historical texts. The volume concludes with a chapter devoted to new results, proofs and some technical details including an overview of a computer program package which has been developed for a posteriori change-point detection.

Jacob PALIS, Floris TAKENS. — **Hyperbolicity and sensitive chaotic dynamics at homoclinic bifurcations.** — Cambridge studies in advanced mathematics, vol. 35. — Un vol. relié, 16 × 24, de x, 234 p. — Prix: £30.00, US\$ 54.95. — Cambridge University Press, Cambridge, 1993.

The book begins with a review chapter giving background material on hyperbolic dynamical systems. The next three chapters give a detailed treatment of a number of examples, Smale's description of the dynamical consequences of transverse homoclinic orbits, and a discussion of the subordinate bifurcations, including Hénon-like families. The core of the work is the investigation of the interplay between homoclinic tangencies and non-trivial basic sets. The fractal dimensions of these basic sets turn out to play an important role in determining which class of dynamics is prevalent near a bifurcation. The authors provide a new, more geometric proof of Newhouse's theorem on the co-existence of infinitely many periodic attractors, one of the deepest theorems in chaotic dynamics.

**Arithmetic, proof theory, and computational complexity.** — Edited by Peter Clote and Jan Krajicek. — Oxford logic guides, vol. 23. — Un vol. relié, 16 × 24, de xii, 428 p. — Prix: £45.00. — Clarendon Press, Oxford, 1993.

From the preface: The theme of this book addresses problems related to Gödel's question: efficiency of propositional proof systems, length of proofs in propositional and predicate logic, theories of bounded arithmetic, and computational complexity theory. The authors of the papers are: M. Baaz, P. Pudlak, M.L. Bonnet, S.R. Buss, J. Krajicek, G. Takeutsi, P. Hajek, F. Montagna, R. Kaye, A.A. Razborov, J.-P. Ressayre, S. Riis, R. Sommer, R. Verbrugge.

**Analysis of controlled dynamical systems.** — Proceedings of a conference held in Lyon, France, July 1990. — Edited by B. Bonnard, B. Bride, J.P. Gauthier, I. Kupka. — Progress in systems and control theory, vol. 8. — Un vol. relié, 16 × 24, de vii, 403 p. — Prix: SFr. 168.00. — Birkhäuser, Boston, 1991.

Topics covered at the conference in Lyon, France in July of 1990 included optimal control, structure and control of nonlinear systems, stabilization and observers, differential algebra and systems theory, nonlinear aspects of  $H$  (infinite) theory, rigid and flexible mechanical systems, and nonlinear analysis of signals. This collection of peer-reviewed papers should provide the interested research worker with a strong overview of the analysis being conducted in the field today.

Sidney I. RESNICK. — **Adventures in stochastic processes.** — Un vol. relié, 16 × 24, de xii, 626 p. — Prix: SFr. 118.00. — Birkhäuser, Boston, 1993.

Stochastic processes are necessary ingredients for building models of a wide variety of phenomena exhibiting time varying randomness. In a lively and imaginative presentation, studded with examples, exercises, and applications, and supported by inclusion of computational procedures, the author has created a textbook that provides easy access to this fundamental topic for many students of applied sciences at many levels. The tools of applied probability — discrete spaces, Markov chains, renewal theory, point processes, branching



processes, random walks, Brownian motion — are presented to the reader. Applications include such topics as queuing, storage, risk analysis, genetics, inventory, choice, economics, sociology, and others.

Gwynne EVANS. — **Practical numerical integration.** — Un vol. relié,  $15,5 \times 24$ , de XII, 328 p. — Prix: £37.95. — John Wiley & Sons, Chichester, 1993.

The book gives an up-to-date and comprehensive coverage of the subject which not only includes classical undergraduate work but also the special areas of oscillatory and singular quadratures. This areas have been the subject of considerable research over the past decade as such integrals arise frequently in practical applications. Throughout the book, the emphasis is on practical methods, with their performance illustrated by a wide rang of examples. These methods are carefully assessed and compared, and a range of exercises is provided to allow the reader to experiment. A link is made with the standard NAG library.

C. ALLDAY, V. PUPPE. — **Cohomological methods in transformation groups.** — Cambridge studies in advanced mathematics, vol. 32. — Un vol. relié,  $16 \times 23,5$ , de XI, 470 p. — Prix: £50.00, US\$69.95. — Cambridge University Press, Cambridge, 1993.

This is an account of certains types of compact transformation groups, namely those that are susceptible to study using ordinary cohomology theory and rational homotopy theory, which in practice means the torus groups and elementary abelian  $p$ -groups. The efforts of many mathematicians have combined to bring a depth of understanding to this area, and this is the first comprehensive treatment of the subject for many years. However, to make it reasonably accessible to a wide audience, the authors have streamlined the presentation, referring the reader to the literature for purely technical results and working in a simplified setting where possible.

H.F. MATTSON. — **Discrete mathematics with applications.** — Wiley international editions. — Un vol. broché,  $20,5 \times 23,5$ , de xxv, 637 p. — Prix: £19.95. — John Wiley, Chichester, 1993.

From the preface: “The purpose of this book is to introduce the reader to the language and techniques of discrete mathematics. If the book succeeds you’ll be well started in mathematics or computer science — both use the same language and much of the same kind of thinking. A good portion of it is useful in electrical or computer engineering as well”. — Contents: — Sets. — Logic. — Mathematical induction. — Equivalence relations and partitions. — Functions. — Divisibility in the integers. — Congruences. — The binomial theorem. — Counting. — Probability. — Recurrence relations. — Matrices and order relations. — Trees. — Graphs. — Answers to selected problems.

George A. ANASTASSIOU. — **Moments in probability and approximation theory.** — Pitman research notes in mathematics series, vol. 187. — Un vol. broché,  $17 \times 24,5$ , de 411 p. — Prix: £39.00. — Longman Scientific and Technical, Harlow, Essex, 1993.

The use of probabilistic methods in other mathematical disciplines has become a trend in recent years, since they produce simple and elegant proofs usually leading to optimal results. This research monograph in approximation theory and probability theory falls into this category. Using methods from geometric moment theory, the author first solves some very important basic moments problems, and then develops in parallel the theories of convergence of positive linear operators to the unit/weak convergence of finite measures to the Dirac

measure, both with rates. The results produced are quantitative inequalities and most of them are either sharp or nearly sharp. Many examples connecting the material to other topics are given.

Nicholas J. HIGHAM. — **Handbook of writing for the mathematical sciences.** — Un vol. broché,  $15,5 \times 23$ , de XII, 241 p. — Prix: US\$21.50. — Society for Industrial and Applied Mathematics (SIAM), Philadelphia, 1993.

This book covers virtually every issue authors face when writing a technical paper or talk, from choosing the right journal to handling references. It discusses fundamental topics, including standard English usage and the steps involved in revising a draft, providing illustrative and provocative examples. Detailed advice is offered on handling the basic ingredients of a research paper, such as notation, displayed equations, and examples. An overview of the entire publication process is provided — invaluable for anyone hoping to publish in a technical journal. This reference book includes an informative glossary, list of prize-winning expository papers, comprehensive index, and extensive bibliography.

A.K. DEWDNEY. — **200% of nothing : an eye-opening tour through the twists and turns of math abuse and innumeracy.** — Un vol. relié,  $16 \times 23,5$ , de IX, 182 p. — Prix: £12.95. — John Wiley, Chichester, 1993.

In this delightfully witty excursion into the world of mathematical manipulation, popular columnist A.D. Dewdney unveils the vast array of ways in which numbers are twisted and statistics are turned in order to fool the unsuspecting public. From the case of the “Incredible Expanding Toyota” to that of the “National Security Googol”, Dewdney exposes the slick tricks and subtle schemes used by advertisers, politicians, special interest lobbyists, stock-brokers, car dealers, and just about anybody who tries to impress us with numbers, charts, and graphs. At turns funny and infuriating, the book is packed with real-life examples from the worlds of advertising, government, business, and media that demonstrate all types of math abuses.

Annemarie SCHIMMEL. — **The mystery of numbers.** — Un vol. relié,  $14,5 \times 22$ , de X, 314 p. — Prix: £22.00. — Oxford University Press, New York, 1993.

In this book, the author shows that numbers have been filled with mystery and meaning since the earliest times, and across every society. She conducts a tour of the mysteries attributed to numbers over the centuries. She begins with an informative and often surprising introduction to the origins of number system and she reveals how the fascination with numbers has led to a rich cross-fertilization of knowledge: “Arabic” numerals, for instance, were picked up by Europe from the Arabs, who had earlier adopted them from Indian sources. The heart of this book is still an engrossing guide to the symbolism of numbers. After exploring the sources of number symbolism, the author examines individual numbers ranging from one to ten thousand, discussing the meanings they have had for Judaic, Christian, and Islamic traditions.

Peter HENRICI. — **Applied and computational complex analysis, vol. 3.** — Discrete Fourier analysis-Cauchy integrals-Construction of conformal maps-Univalent functions. — Wiley-interscience publications. — Wiley classics library. — Un vol. broché,  $16 \times 23$ , de XIII, 637 p. — Prix: £32.95. — John Wiley, Chichester, 1993.

This is the third volume of a work aiming at presenting computational aspects and applications of complex analysis. Of the topics envisaged for volume 3, two represent the core of the book: two-dimensional potential theory and the construction of conformal maps for

simply and multiply connected regions. Contents: Discrete Fourier analysis. — Cauchy integrals. — Potential theory in the plane. — Construction of conformal maps: simply connected regions. — Construction of conformal maps for multiply connected regions. — Polynomial expansions and conformal maps. — Univalent functions.

Domenico BERTOLONI MELI. — **Equivalence and priority: Newton versus Leibniz.** — Including Leibniz's unpublished manuscripts on the "Principia". — Oxford science publications. — Un vol. relié, 16 × 24, de VIII, 318 p. — £55.00. — Clarendon Press, Oxford, 1993.

The book examines the competing world systems put forward by Newton and Leibniz in the late 1680s and their reception up to the beginning of the eighteenth century. Leibniz's dispute with Newton over the physico-mathematical theories have long been identified as a crucial episode in the history of science. Meli examines several hitherto unpublished manuscripts in Leibniz's hand illustrating his first reading of and reaction to Newton's "Principia". Contrary to Leibniz's own claim, this new evidence shows that he had studied Newton's masterpiece before publishing "An essay on the causes of celestial motions". Meli analyses the important implications of this episode on a variety of themes.

Christophe REUTENAUER. — **Free Lie algebras.** — London Mathematical Society monographs, new series, vol. 7. — Un vol. relié, 16 × 24, de XVII, 269 p. — Prix: £55.00. — Clarendon Press, Oxford, 1993.

Although Lie polynomials first appeared at the turn of the century, there have been many recent developments especially from the point of view of representation theory. This book covers all aspects, with emphasis on the algebraic and combinatorial point of view as well as representation theory. Contents: Introduction. — Lie polynomials. — Algebraic properties. — Logarithms and exponentials. — Hall bases. — Applications of Hall sets. — Shuffle algebra and subwords. — Circular words. — The action of the symmetric group. — The Solomon descent algebra.

**Theta functions: from the classical to the modern.** — Edited by M. Ram Murty. — CRM proceedings & lecture notes, vol. 1. — Un vol. broché, 18 × 25,5, de x, 174 p. — Prix du vol. relié: £40.00. — American Mathematical Society, Providence R.I., distributed by Oxford University Press, Oxford, 1993.

From the preface: "Theta functions pervade all of mathematics ranging from the theory of partial differential equations, mathematical physics, to algebraic geometry, number theory and more recently to representation theory... The lectures of this volume represent the content of four courses given at the Centre de Recherches Mathématiques, Montréal, during the academic year 1991-92 devoted to the study of automorphic forms." — Contents: B.C. Berndt: Ramanujan's theory of theta-functions. — J. Hoffstein: Eisenstein Series and Theta functions on the metaplectic group. — D. Prasad: Weil representation, Howe duality, and the theta correspondence. — S. Gelbart: On theta-series liftings for unitary groups.

**p-Adic methods in number theory and algebraic geometry.** — Edited by Alan Adolphson, Steven Sperber, Marvin Tretkoff. — Contemporary mathematics, vol. 133. — Un vol. broché, 18 × 26,5, de VII, 241 p. — Prix: £27.00. — American Mathematical Society, Providence R.I., distributed by Oxford University Press, 1992.

From the preface: "In the fall of 1989, there were meetings of the American Mathematical Society held at Stevens Institute of Technology and Ball State University. Among the special



sessions held at these meetings, two focussed on the role of  $p$ -adic methods in number theory and algebraic geometry. These special sessions are the starting point for this volume. The articles presented here are drawn from a wide area of mathematics; despite that, some aspects of current research in  $p$ -adic arithmetic do not appear here at all. There is no attempt here at comprehensiveness. Our goal is to give a sampling of the wide range of concerns and applications of the  $p$ -adic approach."

Evgenii I. KHUKHRO. — **Nilpotent groups and their automorphisms.** — De Gruyter expositions in mathematics, vol. 8. — Un vol. relié,  $17,5 \times 24,5$ , de XIII, 252 p. — Prix: DM 158.00, US\$49.95. — Walter de Gruyter, Berlin, 1993.

This book is devoted to the exposition of recent results on the structure of nilpotent groups admitting certain groups of automorphisms. The first part presents linear and combinatorial methods in the theory of nilpotent groups. The second part of the book deals with the present state of the theory, including detailed proofs and comments as well as open problems. A particular feature of this text is the interplay of methods and techniques from various parts of mathematics, which leads to interesting and highly non-trivial results.

Norbert STEINMETZ. — **Rational iteration: complex analytic dynamical systems.** — De Gruyter studies in mathematics, vol. 16. — Un vol. relié,  $17,5 \times 24,5$ , de VI, 189 p. — Prix: DM 158, US\$49.95. — Walter de Gruyter, Berlin, 1993.

This book gives a comprehensive and self-contained presentation of the theory of rational iteration. It includes a rigorous treatment of the fundamental work of Julia and Fatou, results of Siegel, Arnol'd and Herman on rotation domains, Sullivan's No Wandering Domain Theorem, and part of the work of Douady and Hubbard on iteration of polynomials. The theory of rational iteration — complex analytic dynamical systems on the Riemann sphere — is a very active field in analytic function theory, partly due to the work of Sullivan, Douady and many others, and partly due to the wonderful computer graphics of Julia-Fatou sets, illustrating the esthetics of this field.

P. LASCAUX, R. THEODOR. — **Analyse numérique matricielle appliquée à l'art de l'ingénieur, tome 1. 2<sup>e</sup> édition refondue.** — Un vol. broché,  $16 \times 24$ , de IX, 326 p. — Prix: FF 220.00. — Masson, Paris, 1993.

La modélisation des problèmes que l'on rencontre dans les sciences de l'ingénieur, conduit à la résolution de systèmes d'équations en dimension finie. Ainsi le calcul scientifique repose-t-il essentiellement sur la résolution de systèmes linéaires -le cas échéant, au sens des moindres carrés- et la recherche de valeurs et vecteurs propres. Cet ouvrage contient un exposé des principales méthodes, depuis les plus classiques (élimination de Gauss, surrelaxation, puissance itérée, QR...) et leurs extensions (matrices creuses, itérations de sous-espaces...) jusqu'aux plus récentes (gradient conjugué préconditionné, multigrille, Lanczos...). De plus, les différents aspects de l'évaluation pratique des algorithmes sont présentés: généralité d'application, précision et stabilité aux erreurs d'arrondi, rapidité de calcul, place mémoire nécessaire, facilité de programmation, essais numériques etc.

**Surveys in combinatorics, 1993.** — Edited by Keith Walker. — London Mathematical Society Lecture Note Series, vol. 187. — Un vol. broché,  $15 \times 23$ , de VIII, 287 p. — Prix: £22.95. — Cambridge University Press, Cambridge, 1993.

This volume is comprised of the invited lectures given at the 14th British Combinatorial Conference, held in July 1993. The lectures survey many topical areas of current research

activity in combinatorics and its applications, including graph theory, cryptography, and finite geometries. — Contents: N. Alon: Restricted colorings of graphs. — Aart Blokhuis: Polynomials in finite geometries and combinatorics. — G. Brightwell: Models of random partial orders. — Andreas Frank: Applications of submodular functions. — Anthony J.W. Hilton & J. Wojciechowski: Weighted quasigroups. — A.A. Ivanov: Graphs with projective subconstituents which contain short cycles. — B. Jackson: On circuit covers, circuit decompositions and Euler tours of graphs. — M.E. Saks: Slicing the hypercube. — D.R. Stinson: Combinatorial designs and cryptography.

D.J.A WELSH. — **Complexity: knots, colourings and counting.** — London Mathematical Society Lecture Note series, vol. 186. — Un vol. broché,  $15 \times 23$ , de VIII, 163 p. — Prix: £19.95. — Cambridge University Press, Cambridge, 1993.

These notes are based on a series of lectures given at the Advanced Research Institute of Discrete Applied Mathematics held at Rutgers University. Their aim is to link together algorithmic problems arising in knot theory, statistical physics and classical combinatorics. Apart from the theory of computational complexity concerned with enumeration problems, introductions are given to several of the topics treated, such as combinatorial knot theory, randomised approximation algorithms, percolation and random cluster models.

**Geometric group theory, vol. 1.** — Proceedings of the Symposium held in Sussex, 1991. — Edited by Graham A. Niblo and Martin A. Roller. — London Mathematical Society lecture note series, vol. 181. — Un vol. broché,  $15 \times 23$ , de 212 p. — Prix: £22.95. — Cambridge University Press, Cambridge, 1993.

A.F. Beardon: Group actions and Riemann surfaces. — M. Bestvina: The virtual cohomological dimension of Coxeter groups. — R. Bieri: The geometric invariants of a group. — D.E. Cohen: String rewriting — a survey for group theorists. — A.J. Duncan, J. Howie: One relator products and high-powered relators. — M.J. Dunwoody: An inaccessible group. — S.M. Gersten: Isoperimetric and isodiametric functions of finite presentations. — P. de la Harpe: On Hilbert's metric for simplices. — D.F. Holt, S. Ree: Software for automatic groups, isomorphism testing and finitely presented groups. — J. Howie, R.M. Thomas: Proving certain groups infinite. — A. Juhasz: Some applications of small cancellation theory to one-relator groups and one-relator products. — P.H. Kropholler: A group theoretic proof of the torus theorem. — M. Lustig, Y. Moriah:  $N$ -torsion and applications. — Ch. Pittet: Surface groups and quasi-convexity. — M.A. Roller: Constructing group actions on trees. — J.R. Stallings: Brick's quasi simple filtrations and 3-manifolds. — G.A. Swarup: A note on accessibility. — G.A. Niblo: Geometric group theory 1991 problem list.

**Geometric group theory, vol. 2.: Asymptotic invariants of infinite groups by M. Gromov.** — Proceedings of the Symposium held in Sussex, 1991. — Edited by Graham A. Niblo, Martin A. Roller. — London Mathematical Society lecture note series, 182. — Un vol. broché,  $15 \times 23$ , de VII, 295 p. — Prix: £22.95. — Cambridge University Press, Cambridge, 1993.

This second volume contains solely a ground breaking paper by Gromov, which provides a fascinating look at finitely generated groups. For anyone whose interest lies in the interplay between groups and geometry, the two volume set of these proceedings will be an essential addition to their library. — Contents of vol.2: Asymptotic methods. — Asymptotic cones. — Distorsion. — Topology of balls. — Filling invariants. — Semi-hyperbolic spaces. — Hyperbolic groups. —  $L_p$ -cohomology. — Finitely presented groups.

Gordon JAMES and Martin LIEBECK. — **Representations and characters of groups.** — Cambridge mathematical textbooks. — Un vol. broché, 15 × 23, de x, 419 p. — Prix: £45.00. — Cambridge University Press, Cambridge, 1993.

This book provides a modern introduction to the representation theory of finite groups. The theory is developed in terms of modules, since this is appropriate for more advanced work, but considerable emphasis is placed upon constructing characters. The character tables of many groups are given, including all groups of order less than 32, and all but one of the simple groups of order less than 1000. Amongst those applications covered are Burnside's theorem, the use of character theory in studying subgroup structure, and a description of how to use representation theory to investigate molecular vibration. Each chapter is accompanied by a variety of exercises, and full solutions to all the exercises are provided.

J.R. RETHERFORD. — **Hilbert space: compact operators and the trace theorem.** — London Mathematical Society student texts, vol. 27. — Un vol. broché, 15 × 23, de xii, 131 p. — Prix: £13.95 (relié: £27.95). — Cambridge University Press, Cambridge, 1993.

The author's aim in this book is to provide the reader with a virtually self-contained treatment of Hilbert space theory, leading to an elementary proof of the Lidskij trace theorem. He assumes the reader is familiar with only linear algebra and advanced calculus, and develops everything needed to introduce the ideas of compact, self-adjoint, Hilbert-Schmidt and trace class operators. Many exercises and hints are included, and the emphasis throughout is on a user-friendly approach.

Nassif GHOUSSOUB. — **Duality and perturbation methods in critical point theory.** — Cambridge tracts in mathematics, vol. 107. — Un vol. relié, 15,5 × 23, de xviii, 258 p. — Prix: £35.00. — Cambridge University Press, Cambridge, 1993.

Geodesics, harmonic maps, conformal metrics with prescribed curvature, subharmonics of Hamiltonian systems and Yang-Mills fields are all critical points of some functional on appropriate manifold. To find unstable critical points, Morse theory and min-max methods were developed earlier this century. Here the author describes a new but elementary point of view that may help when dealing with such problems. Building upon classical min-max methods, he systematically develops a general theory that can be applied in a variety of situations. The novel elements consist of a whole array of newly developed duality and perturbation methods with which critical point theory can be developed and vastly enriched.

T.W. KOERNER. — **Exercises for Fourier analysis.** — Un vol. broché, 17,5 × 25, de x, 385 p. — Prix: £15.95 (relié: £35.00). — Cambridge University Press, Cambridge, 1993.

For physicists, engineers and mathematicians, Fourier analysis constitutes a tool of great usefulness. A wide variety of the techniques and applications of the subject were discussed in the author's book "Fourier analysis". In the present text the author has compiled a collection of exercises on the subject that will thoroughly test the understanding of the reader. They are arranged chapter by chapter to correspond with "Fourier analysis", and for all who enjoyed that book, this companion volume will be an essential purchase.

**Ordered algebraic structures : the 1991 Conrad Conference.** — Edited by J. Martinez and C. Holland. — Un vol. relié, 16,5 × 24,5, de xiii, 258 p. — Prix: Dfl. 190.00, US\$110.50, £78.00. — Kluwer Academic Publishers, Dordrecht, 1993.

This volume contains a selection of papers presented at the 1991 Conrad Conference, held in Gainesville, Florida, in December 1991. Together, these give an overview of some recent advances in the area of ordered algebraic structures. The first part of the book is devoted to ordered permutation groups and universal, as well as model-theoretic, aspects. The second part deals with material variously connected to general topology and functional analysis. Collectively, the contents of the book demonstrate the wide applicability of order-theoretic methods, and how ordered algebraic structures have connections with many research disciplines.

V.L. KOCIC and G. LADAS. — **Global behavior of nonlinear difference equations of higher order with applications.** — Mathematics and its applications, vol. 256. — Un vol. relié, 16,5 × 24,5, de xi, 228 p. — Prix: Dfl. 175.00, US\$102.00, £72.00. — Kluwer Academic Publishers, Dordrecht, 1993.

This volume presents a systematic study of the global behavior of solutions of nonlinear scalar difference equations of order greater than one. Of particular interest are aspects such as global asymptotic stability, periodicity, permanence and persistence, and also semicycles of solutions. As well as exposing the reader to the very frontiers of the subject, important open problems are also formulated.

**Models of hysteresis.** — Edited by A. Visintin. — Pitman research notes in mathematics series, vol. 286. — Un vol. broché, 17 × 24,5, de 221 p. — Prix: £25.00. — Longman Scientific and Technical, Harlow, Essex, 1993.

From the introduction: "This volume collects the proceedings of a workshop on "Models of hysteresis", held in Trento at Villa Madruzzo in September 1991, in the framework of the activity of C.I.R.M. (Centro Internazionale per la Ricerca Matematica) of the Istituto Trentina di Cultura. Forty-four researchers participated, presenting twenty-five talks. This was the second of series of meetings, bringing together mathematicians interested in the study of hysteresis models and applied scientists (mainly physicists and engineers) active in research on hysteresis phenomena. All of the prominent mathematicians active in modelling hysteresis phenomena attended. So this volume offers a picture of the state of the art of this fully developing field of mathematical research".

**Ordinary and partial differential equations, vol. IV.** — Proceedings of the twelfth Dundee Conference, 1992, in honour of Professor D.S. Jones. — Edited by B.D. Sleeman and R.J. Jarvis. — Pitman research notes in mathematics series, vol. 289. — Un vol. broché, 17 × 24,5, de 292 p. — Prix: £30.00. — Longman Scientific and Technical, Harlow, Essex, 1993.

This volume contains papers by a number of experts. Special emphasis is given to recent developments in the asymptotic behaviour of solutions to differential equations, scattering theory and neural systems. Of particular note is a comprehensive survey of major contributions to the study of counting function asymptotics for fractal domains. Topics covered include direct and inverse scattering problems, asymptotic expansions and Stokes phenomenon, the Weyl-Berry conjecture, pattern generation in neural systems, reactive transport and dispersal of waste, and integral inequalities.

David ANICK. — **Differential algebras in topology.** — Research notes in mathematics, vol. 3. — Un vol. relié, 16 × 24, de x, 274 p. — Prix: US\$49.50. — A.K. Peters, Wellesley, Massachusetts, 1993.

This monograph deals with the construction of a new family of finite complexes as an extension of the odd-dimensional Moore space. The significance of this book lies in its inception of a number of powerful original concepts in algebraic topology. These ideas include homotopy operations under a space, the theory of thin products, and coherent sequences of algebras or Lie algebras. The new ideas contribute to the generalization of the Quillen-Sullivan rational homotopy theory to positive characteristics as well as to the decomposition of a loop space into minimal  $H$ -space factors.

Philip J. DAVIS, with contributions by Walter GAUTSCHI and Arie ISELES. — **Spirals: from Theodorus to chaos.** — Un vol. relié, 16 × 23,5, de VIII, 237 p. — Prix: US\$29.95. — A.K. Peters, Wellesley, Massachusetts, 1993.

Although loosely organized around the study of a difference equation that Davis dubs Theodorus of Cyrene, the book takes us on an eclectic whirlwind tour of history, philosophy, anecdote and, of course, mathematics. Incorporating the old and the new, the proved and the conjectural, Davis examines Theodorus in light of the mathematical concerns that have grown and changed over the past twenty-five hundred years. His tale will undoubtedly fascinate mathematics lovers of all levels.

Vagn Lundsgaard HANSEN. — **Geometry in nature.** — Translated by Tom Artin. — Un vol. relié, 17 × 21, de XIII, 238 p. — Prix: US\$29.95. — A.K. Peters, Wellesley, Massachusetts, 1993.

In this book, the author enlightens our geometric outlook by choosing current topics where he can demonstrate the conceptual beauty of geometry and its relevance to real-life applications. The author allows us to marvel at the remarkable staying-power of historic geometric ideas and yet heed the continual mathematical challenges that await us in the future. The book will appeal to all “mathematicians” from various scientific background. — Contents: Geometric forms in nature. The topology of surfaces. The topology of catastrophes. Geometry and the physical world. Geometry and modern physics.

Lloyd D. FISHER, Gerald VAN BELLE. — **Biostatistics: a methodology for the health sciences.** — Wiley series in probability and mathematical statistics. Applied probability and statistics. — A Wiley-interscience publication. — Un vol. relié, 16,5 × 25, de XXII, 991 p. — Prix: £62.00. — John Wiley, Chichester, 1993.

The book is the first introductory text for those new to the very practical uses of statistics in the biomedical sciences. The book opens with a chapter on the design of medical studies (including forms design) and then proceeds to a detailed discussion of descriptive statistics. Introductory ideas of probability theory and statistical inference (both estimation and hypothesis testing) are then developed. Finally, discussion progresses to more advanced statistical methods, which include: Robustness and nonparametric statistics. Analysis of variance and covariance. Multiple comparisons. Discrimination and classification. Principle component analysis and factor analysis. Survival analysis (including life tables, product-limit estimates, Cox proportional hazards regression). Sample sizes for observational studies. Additionally, a concluding chapter illustrates the important uses of biostatistics today, forming a rare, comprehensive look at the field.

Gérard HIRSCH, Gérard EGUETHER. — **Courbes en coordonnées paramétriques ou polaires: 250 exercices corrigés.** — Collection «Comprendre et appliquer». Série Mathématiques pratiques élémentaires, vol. 23. — Un vol. broché, 18 × 24, de 125 p. — Prix: FF 88.00. — Masson, Paris, 1993.



Cet ouvrage est consacré à la construction des courbes planes définies par une représentation paramétrique et polaire. Les techniques utilisées supposent acquises la connaissance des fonctions d'une variable réelle (limite, continuité, dérivation, développement limités) ainsi que les bases de la géométrie plane (symétries orthogonales, rotations, translations). L'exposé se réfère à des fonctions de la variable réelle  $t$ , à valeurs dans  $R$  (fonctions directement applicables aux problèmes de mécanique et de physique dans lesquels  $t$  représente le temps). La dernière partie de l'ouvrage propose une série d'applications géométriques, à l'occasion desquelles se dégagera une synthèse de l'ensemble des méthodes exposées.

Raymond M. SMULLYAN. — **Les théorèmes d'incomplétude de Gödel.** — Traduit de l'anglais par Maurice Margenstern. — Collection Axiomes. — Un vol. broché,  $16 \times 24$ , de XI, 134 p. — Prix: FF 240.00. — Masson, Paris, 1993.

L'auteur relève dans cet ouvrage une gageure a priori impossible: exposer en termes simples et limpides des démonstrations techniquement complexes, sans rien sacrifier à la rigueur mathématique. En effet, malgré l'aridité de la technique originelle de Gödel, les idées qui ont conduit à ces démonstrations sont relativement accessibles. L'auteur présente ici une synthèse de cinquante années de recherche sur les diverses approches de ces théorèmes. La dernière partie de l'ouvrage, en particulier, analyse les conséquences de ces résultats sur les récents développements de la logique modale.

Herbert SCHROEDER. —  **$K$ -theory for real  $C^*$ -algebras and applications.** — Pitman research notes in mathematics series, vol. 290. — Un vol. broché,  $17 \times 24,5$ , de XIV, 162 p. — Prix: £24.00. — Longman Scientific and Technical, Harlow, Essex, 1993.

This note presents the  $K$ -theory and  $KK$ -theory for real  $C^*$ -algebras and shows that these can be successfully applied to solve some topological problems which are not accessible by the tools developed in the complex setting alone. Included are many explicit computations of real  $K$ -groups showing the more refined structure of real  $C^*$ -algebras, or of real forms of complex ones. In special cases the non-stable  $K$ -theory is also determined. The  $K$ -theoretical formulation of index theory for real pseudodifferential operators on compact manifolds and of longitudinal index theory on foliations with applications to vanishing theorems is also provided.

S.H. LEHNIGK. — **The generalized Feller equation and related topics.** — Pitman monographs and surveys in pure and applied mathematics, vol. 68. — Un vol. relié,  $16,5 \times 24,5$ , de XVI, 292 p. — Prix: £46.00. — Longman Scientific and Technical, Harlow, Essex, 1993.

From the preface: "The main subject matter is a one-dimensional, autonomous, parabolic equation of Fokker-Plank type. Diffusion and drift coefficients are certain power law functions of the independent space variable. Because of singularities at the origin, the space variable is restricted, in general, to the positive half-axis. The coefficients are also functions of four mutually independent parameters identified as diffusion, drift, and initial and terminal shape parameters". — Contents: The generalized Feller equation. — The source solution. — Initial condition solutions. — Boundary conditions solutions. — Integral representations. — Basis functions and series expansions. — A generalized theta function. — Probability density functions. — Parameter estimation. — Characteristic functions.

Masao NAGASAWA. — **Schrödinger equations and diffusion theory.** — Monographs in mathematics, vol. 86. — Un vol. relié,  $17 \times 24,5$ , de 319 p. — Prix: SFr. 138.00. — Birkhäuser, Basel, 1993.

The book addresses the question “What is the Schrödinger equation ?” in terms of diffusion processes, and shows that the Schrödinger equation and diffusion equations in duality are equivalent. In turn, Schrödinger’s conjecture of 1931 is solved. The theory of diffusion processes for the Schrödinger equation tells us that we must go further into the theory of systems of (infinitely) many interacting quantum (diffusion) particles. The method of relative entropy and the theory of transformations enable us to construct severely singular diffusion processes which appear to be equivalent to Schrödinger equations. The theory of large deviations and the propagation of chaos of interacting diffusion particles reveal the statistical nature of the Schrödinger equation, namely, quantum mechanics.

Manuel D.P. MONTEIRO MARQUES. — **Differential inclusions in nonsmooth mechanical problems: shocks and dry friction.** — Progress in nonlinear differential equations and their applications, vol. 9. — Un vol. relié, 16,5 × 24, de 179 p. — Prix: SFr. 88.00. — Birkhäuser, Basel, 1993.

This book is devoted to evolution problems which arise in the dynamics of mechanical systems involving unilateral constraints, possibly in the presence of dry friction. Collisions may be the result. In such a context, the velocity function cannot be expected to be absolutely continuous, so the traditional theory of differential equations or inclusions does not apply. Some effective numerical techniques have been proposed, but the existence results were missing until now. This book starts filling the gap.

Mariano GIAQUINTA. — **Introduction to regularity theory for nonlinear elliptic systems.** — Lectures in mathematics, ETH Zürich. — Un vol. broché, 17 × 24, de VIII, 130 p. — Prix: SFr. 34.00. — Birkhäuser Verlag, Basel, 1993.

These lectures are an introduction to the regularity theory of minimizers of variational integrals in the calculus of variations and of solutions of nonlinear elliptic systems. Topics are presented in simple situations with view to avoiding technical difficulties. They include the Hilbert-space approach to boundary value problems and energy estimates, Schauder-estimates and  $L_p$ -theory for linear systems, without using potential theory, De Giorgi’s regularity theorem and Moser-Harnack inequality in the context of the unifying notion of quasi-minima, and model results of the regularity theory in the vector valued case, including simple theorems concerning the regularity of harmonic maps between Riemannian manifolds.

Matthias SCHWARZ. — **Morse homology.** — Progress in mathematics, vol. 111. — Un vol. relié, 16,5 × 24, de IX, 235 p. — Prix: SFr. 68.00. — Birkhäuser Verlag, Basel, 1993.

This book presents a link between modern analysis and topology. Based upon classical Morse theory it develops the finite dimensional analogue of Floer homology which, in the recent years, has come to play a significant role in geometry. Morse homology naturally arises from the gradient dynamical system associated with a Morse function. The underlying chain complex, already considered by Thom, Smale, Milnor and Witten, analogously forms the basic ingredient of Floer’s homology theory. This concept of relative Morse theory in combination with Conley’s continuation principle lends itself to an axiomatic homology functor.

Drumi BAINOV, Pavel SIMEONOV. — **Impulsive differential equations: periodic solutions and applications.** — Pitman monographs and surveys in pure and applied mathematics, vol. 66. — Un vol. relié, 16 × 24, de X, 228 p. — Prix: £38.00. — Longman Scientific and Technical, Harlow, Essex, 1993.

Impulsive differential equations have been an object of intensive investigation during recent years, due to the wide possibilities for their application in various fields of science and

technology. This monograph deals with periodic solutions of impulsive differential equations. Periodic linear impulsive differential equations are studied in detail. The use of the small parameter method in noncritical and critical cases is justified. The question of the existence of periodic solutions of nonlinear impulsive differential equations is discussed and various approximate methods of finding these solutions are justified.

Ethan AKIN. — **The general topology of dynamical systems.** — Graduate studies in mathematics, vol. 1. — Un vol. relié,  $18 \times 26$ , de x, 261 p. — Prix: £34.50. — American Mathematical Society, Providence, R.I., distributed by Oxford University Press, Oxford, 1993.

Introduction: Gradient systems. — Closed relations and their dynamic extensions. — Invariant sets and Lyapunov functions. — Attractors and basic sets. — Mappings: invariant subsets and transitivity concepts. — Computation of the chain recurrent set. — Chain recurrence and Lyapunov functions for flows. — Topologically robust properties of dynamical systems. — Invariant measures for mappings. — Examples: circles, simplex, and symbols. — Fixed points. — Hyperbolic sets and axiom A homeomorphisms. — Historical remarks and references.

**Identification and control in systems governed by partial differential equations.** — Proceedings of the Conference on Control and Identification of Partial Differential Equations, Mount Holyoke College, South Hadley, Mass., July 11-16, 1992. — Edited by H.T. Banks, R.H. Fabiano, K. Ito. — Un vol. broché,  $17,5 \times 25,5$ , de ix, 234 p. — Prix: US\$48.50. — Society for Industrial and Applied Mathematics, Philadelphia, 1993.

Written on a graduate research level, this collection of invited papers focuses on issues related to modeling (including design), parameter estimation and system identification, and feedback control for problems described by partial differential equations. It includes applications of flow control (in high pressure vapor transport reactors, airfoil design, and noise suppression) as well as control of structures (beams, plates, robot arms and smart material structures).

Alfred GRAY. — **Modern differential geometry of curves and surfaces.** — Studies in advanced mathematics. — Un vol. relié,  $20 \times 24$ , de xviii, 664 p. — Prix: £48.00. — CRC Press, Boca Raton, distributed by Mosby-Year Book Europe, Larkfield, Kent, 1993.

This book explains the mathematics of curves and surfaces and provides computational demonstrations and explorations using Mathematica examples... shows how to define and compute standard geometric functions... discusses how to apply techniques from numerical analysis in differential geometry of curves and surfaces... includes a special Mathematica appendix with 175 Mathematica programs... tested extensively in classrooms and used in professional short courses... integrates traditional differential geometry with new computer demonstration capabilities.

William FULTON. — **Introduction to toric varieties.** — The William H. Roever lectures in geometry. — Annals of mathematics studies, vol. 131. — Un vol. broché,  $15,5 \times 23,5$ , de xi, 157 p. — Prix: U.S.A. \$ 16.95 (relié \$ 32.50), tout autre pays £ 14.95 (relié £ 24.50). — Princeton University Press, Princeton NJ, 1993.

From the preface: "The goal of this mini-course is to develop the foundational material, with many examples, and then to concentrate on the topology, intersection theory, and Riemann-Roch problem on toric varieties. These are applied to count lattice points in polytopes, and study volumes of convex bodies. The note conclude with Stanley's application



of toric varieties to the geometry of simplicial polytopes. Relations between algebraic geometry and others subjects are emphasized, even when proofs without algebraic geometry are possible”.

Hirota FUJIMOTO. — **Value distribution theory of the Gauss map of minimal surfaces in  $\mathbf{R}^m$ .** — Aspects of mathematics, vol. E21. — Un vol. relié,  $16 \times 23$ , de XIII, 207 p. — Prix: DM 64.00, US\$ 46.00. — Vieweg, Braunschweig, Wiesbaden, 1993.

The main subject of this book is the parallelism between classical function theory, in particular value distribution theory of holomorphic curves in projective space, on the one hand, and the differential-geometric theory of the Gauss map of minimal surfaces on the other hand. The author has found, that there are, in complete analogy to function theory, Picard type theorems and defect relations also for the Gauss map of minimal surfaces. The book presents this analogy in an almost self-contained way. The classical value distribution theory of holomorphic curves in projective space is fully developed and afterwards the differential-geometric theory of Gauss map is presented.

Robert LUPTON. — **Statistics in theory and practice.** — Un vol. relié,  $16 \times 24,5$ , de x, 188 p. — Prix: US\$ 24.95, tout autre pays £ 19.95. — Princeton University Press, Princeton N.J., 1993.

This book explains the theory underlying the classical statistical methods. Among the topics covered are common probability distributions; sampling and the distribution of sampling statistics; confidence intervals, hypothesis testing, and the theory of tests; estimation, goodness of fit; and nonparametric and rank tests. There are nearly one hundred problems (with answers) designed to bring out points in the text and to cover topics slightly outside the main line of development. Its level is between introductory “how to” texts and intimidating mathematical monographs.

Françoise CHATELIN. — **Eigenvalues of matrices.** — With exercices by Mario Ahués and Françoise Chatelin; translated with additional material by Walter Ledermann. — Un vol. relié,  $15,5 \times 23,5$ , de XVIII, 382 p. — Prix: £ 45.00. — John Wiley, Chichester, 1993.

From the preface: “The calculation of eigenvalues is a problem of great practical and theoretical importance. Here are two very different types of application: in the dynamics of structures it is essential to know the resonance frequency of the structure; for example, we mention the vibrations of the propeller blades in ships or helicopters, the influence of the swell on drilling platforms in the sea, the reaction of buildings in earthquakes. Another class of fundamental applications is related to the determination of the critical value of a parameter for the stability of a dynamical system such as a nuclear reactor... The object of this book is to give a modern and complete theory, on an elementary level, by presenting in matrix notation the fundamental aspects of the theory of linear operators in finite dimensions.”

Elias M. STEIN. — **Harmonic analysis: real-variable methods, orthogonality and oscillatory integrals.** — With the assistance of Timothy S. Murphy. — Monographs in harmonic analysis, vol. 3. — Princeton mathematical series, vol. 43. — Un vol. relié,  $16,5 \times 24,5$ , de XIII, 695 p. — Prix: US\$ 69.50, tout autre pays £ 55.00. — Princeton University Press, Princeton N.J., 1993.

This book contains an exposition of some of the main developments of the last twenty years in the following areas of harmonic analysis: singular integral and pseudo-differential operators,

the theory of Hardy spaces,  $L^p$  estimates involving oscillatory integrals and Fourier integral operators, relations of curvature to maximal inequalities, and connections with analysis on the Heisenberg group. This book is divided into three parts: the first five chapters take up real-variable theory; the next six chapters emphasize  $L^2$  methods and oscillatory integrals; the last two chapters introduce analysis on the Heisenberg group and also provide a retrospective view of some the preceding material.

M.A. AKIVIS, V.V. GOLDBERG. — **Projective differential geometry of submanifolds.** — North-Holland mathematical library, vol. 49. — Un vol. relié, 15,5 × 23, de xi, 362 p. — Prix: Dfl. 225.00, US\$ 128.50 — North-Holland, Amsterdam, 1993.

In this book, the general theory of submanifolds in a multidimensional projective space is constructed. The topics dealt with include osculating spaces and fundamental forms of different orders, asymptotic and conjugate lines, submanifolds on the Grassmannians, different aspects of the normalization problems for submanifolds (with special emphasis given to a connection in the normal bundle) and the problem of algebraizability for different kinds of submanifolds, the geometry of hypersurfaces and hyperbands, etc. A series of special types of submanifolds with special projective structures are studied: submanifolds carrying a net of conjugate lines (in particular, conjugate systems), tangentially degenerate submanifolds, submanifolds with asymptotic and conjugate distributions etc.

M.L.J. VAN DE VEL. — **Theory of convex structures.** — North-Holland mathematical library, vol. 50. — Un vol. relié, 15,5 × 23, de xv, 540 p. — Prix: Dfl. 275.00, US\$ 157.25. — North-Holland, Amsterdam, 1993.

Presented in this monograph is the current state-of-the-art in the theory of convex structures. The notion of convexity covered here is considerably broader than the classic one; specifically, it is not restricted to the context of vector spaces. Classical concepts of order-convex sets (Birkhoff) and of geodesically convex sets (Menger) are directly inspired by intuition; they go back to the first half of this century. An axiomatic approach started to develop in the early Fifties. The author became attracted to it in the mid-Seventies, resulting in the present volume, in which graphs appear side-by-side with Banach spaces, classical geometry with matroids, and ordered sets with metric spaces.

A.M. TURING. — **Collected works of A.M. Turing, vol. 3: morphogenesis.** — Edited by P.T. Saunders. — . — Un vol. relié 17 × 25, de xxv, 131 p. — Prix: US\$ 106.50, Dfl. 170.00. — North-Holland, Amsterdam, 1993.

The collected works of Turing, including a substantial amount of unpublished material, will comprise four volumes. The author is today mentioned frequently in philosophical discussions about the nature of artificial intelligence. Actually, he was a pioneer researcher in computer architecture and software engineering; his work in pure mathematics and mathematical logic extended considerably further and his last work, on morphogenesis in plants, is also acknowledged as being of the greatest originality and of permanent importance. He was one of the leading figures in Twentieth-century science, a fact which would have been known to the general public sooner but for the British Official Secrets Act, which prevented discussion of his wartime work.

**Noncommutative distributions: unitary representation of gauge groups and algebras.** — Sergio A. Albeverio, Raphael J. Hoegh-Krohn, Jean A. Marion, Daniel H. Testard, Bruno S. Torr sani. — Monographs and textbooks in pure and applied mathematics, vol. 175. — Un vol. reli , 16 × 23,5, de viii, 190 p. — Prix: US\$ 99.75. — Marcel Dekker, New York, 1993.

Covering the most important aspects of the theory of unitary representations of nuclear Lie groups, this self-contained reference presents the general theory of energy representations and addresses various extensions of path groups and algebras. The book examines a theory of noncommutative distributions as irreducible unitary representations of groups of mappings from a manifold into a Lie group, with applications to gauge field theories... describes energy representation when the target Lie group  $G$  is compact... discusses representations of  $G$ -valued jet bundles when  $G$  is not necessarily compact... details the results of the irreducibility of underlying manifolds... supplies a synthesis of deep results on quasi-simple Lie algebras... etc.

Watson FULKS. — **Complex variables: an introduction.** — Monographs and textbooks in pure and applied mathematics, vol. 176. — Un vol. relié,  $16 \times 23,5$ , de VIII, 402 p. — Prix: US\$49.75. — Marcel Dekker, New York, 1993.

This practical textbook offers a solid discussion of the mathematics, clear expositions, and a wide selection of applications for complex variables. Providing a variety of exercises, the book introduces Cauchy's theorems for polynomials and rational functions in the first chapter... furnishes a systematic treatment of applications to potential theory of particular value to science and engineering students... defines exponential and trigonometric functions as infinite series to display their connection with the corresponding real-valued functions of elementary calculus... clarifies the multivaluedness of the logarithm by introducing it as an integral early in the book... examines Laplace transforms, differential equations, conformal mapping, analytic continuations... Riemann surfaces... etc.

M.M. RAO. — **Conditional measures and applications.** — Monographs and textbooks in pure and applied mathematics, vol. 177. — Un vol. relié,  $16 \times 23,5$ , de IX, 417 p. — Prix: US\$135.00. — Marcel Dekker, New York, 1993.

This reference-text offers a thorough analysis of conditional expectations and probability measures and demonstrates their important uses in real situations. Presenting different characterizations of conditional operators and measures to illuminate the abstract and functional analytic nature of conditioning, the book includes applications to sufficiency, Markov processes, martingales, and analysis problems... supplies Kolmogorov's formulation and its properties... provides an axiomatic method for simplifying problems as an abstraction of Kolmogorov's definition... examines the Rényi model and shows that it may be seen as a particular case of Kolmogorov's general formulation... explicates sufficient statistics... illustrates difficulties in the calculation of conditional expectations for continuous multivariable distributions... provides methods for correct solutions... etc.

**Differential equations in Banach spaces** — Proceedings of the Bologna conference. — Edited by Giovanni Dore, Angelo Favini, Enrico Obrecht, Alberto Venni. — Lecture notes in pure and applied mathematics, vol. 148. — Un vol. broché,  $18 \times 25,5$ , de X, 270 p. — Prix: US\$115.00. — Marcel Dekker, New York, 1993.

This book based on the recent Conference on Differential Equations held in Bologna, Italy-provides up-to-date information on the most current research in parabolic and hyperbolic differential equations. Presenting methods and results in semigroup theory and their applications to evolution equations, the book focuses on abstract parabolic and hyperbolic linear differential equations... nonlinear abstract parabolic equations... holomorphic semigroups... Volterra operator integral equations... Euler-Bernoulli equations... etc.

George GRAETZER. — **Math into TEX: a simple introduction to AMS-LATEX.** — Un vol. broché,  $18 \times 25,5$ , de XXIX, 294 p. — Prix: SFr. 58.00. — Birkhäuser, Boston, 1992.

This book provides the beginner with a simple and direct approach to typesetting mathematics with AMS-LATEX. Using many examples, a formula gallery, sample files, and templates, Part I guides the reader through setting up the system, typing simple text and math formulas, and creating an article template. Part II is a systematic discussion of all aspects of AMS-LATEX and contains both examples and detailed rules. Part III and the appendices take up more specialized topics, from customizing AMS-LATEX to the use of PostScript fonts. Even with no prior experience using any form of TEX, the mathematician, scientist, engineer, or technical typist, can begin preparing articles in a day or two using AMS-LATEX.

**Continuum theory and dynamical systems.** — Edited by Thelma West. — Lecture notes in pure and applied mathematics, vol. 149. — Un vol. broché,  $18 \times 25$ , de VIII, 296 p. — Prix: US\$115.00. — Marcel Dekker, New York, 1993.

Based on the Conference/Workshop on Continuum Theory and Dynamical Systems held in Lafayette, Louisiana, this reference illustrates the current expansion of knowledge on the relationship between these subjects and present new problems in hyperspace, induced maps, universal maps, fixed-point sets, disconnection numbers, and quotient maps. The book examines prime end (accessible) rotation numbers for chaotic sets and Hénon maps...discusses the connection between the rotation shadowing property and the structure of the rotation sets for annulus homeomorphisms... offers a Nielsen-type theorem concerning the minimum number of fixed points for an area preserving homeomorphism of the two disk...gives a geometric description of a horseshoe-type mapping of a plane disk into itself whose attracting set is not chainable... etc.

Michael E. POHST. — **Computational algebraic number theory.** — DMV Seminar, Bd. 21. — Un vol. broché,  $17 \times 24$ , de 88 p. — Prix: SFr. 34.00. — Birkhäuser, Basel, 1993.

The subject has been attracting broad interest in the last few years due to its potential applications in coding theory and cryptography. For this reason, the Deutsche Mathematiker-Vereinigung initiated an introductory graduate seminar on this topic in Düsseldorf. The lectures given there by the author served as the basis for this book which allows fast access to the state of the art in this area. Special emphasis has been placed on practical algorithms -all developed in the last five years- for the computation of integral bases, the unit group and the class group of arbitrary algebraic number fields.