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# BULLETIN BIBLIOGRAPHIQUE

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Louis H. KAUFFMAN. — **Knots and physics.** — Series on knots and everything, vol. 1. — Un vol. relié, 16 × 22,5, de XI, 538 p. — World Scientific, Singapore, 1991.

From the preface: This book has its origins in two short courses given by the author in Bologna and Torino, Italy during the Fall of 1985. The book is divided into two parts. The first part is combinatorial, elementary, devoted to the bracket polynomial as state model, partition function, vacuum-vacuum amplitude, expositions of Yang-Baxter model for the Homfly and Kauffman polynomials — as discovered by Jones and Turaev, and a treatment of the Alexander polynomial based on work of F. Jaeger, H. Saleur and the author. Part I ends with an introduction to Witten's functional integral formalism, and shows how the knot polynomials arise in that context. Part II is an exposition of a set of related topics, and provides room for recent developments.

Sydney CHAPMAN and T.G. COWLING. — **The mathematical theory of non-uniform gases.** — An account of the kinetic theory of viscosity, thermal conduction and diffusion in gases. — Third edition prepared in co-operation with D. Burnett. — Cambridge Mathematical Library. — Un vol. broché, 15,5 × 23, de XXIV, 422 p. — Prix: £19.50/US\$32.50. — Cambridge University Press, Cambridge, 1991.

This book, now reissued in paperback, presents a detailed account of the mathematical theory of viscosity, thermal conduction and diffusion in non-uniform gases based on the solution of the Maxwell-Boltzmann equations. The theory of Chapman and Enskog, describing work on dense gases, quantum theory of collisions and the theory of conduction and diffusion in ionized gases in the presence of electric and magnetic fields, is extended in the later chapters. The third edition was first published in 1970 and included revisions to take account of the extensions of the theory to fresh molecular models and of new methods used in discussing dense gases and plasmas.

Elemér E. ROSINGER. — **Non-linear partial differential equations: an algebraic view of generalized solutions.** — North-Holland mathematics studies, vol. 164. — Un vol. relié, 17 × 24,5 de XXI, 380 p. — Prix: US\$120.00/Dfl. 210.00. — North-Holland, Amsterdam, 1990.

A massive transition of interest from solving linear partial differential equations to solving nonlinear ones has taken place during the last two or three decades. The availability of better computers has often made numerical experimentations progress faster than the theoretical understanding of nonlinear partial differential equations. The three most important nonlinear phenomena observed so far both experimentally and numerically, and studied theoretically in connection with such equations have been the solitons, shock waves and turbulence or chaotic

processes. In particular, the latter two phenomena necessarily lead to nonclassical or generalized solutions for nonlinear partial differential equations.

Jürgen PILZ. — **Bayesian estimation and experimental design in linear regression models.** — 2nd ed. — Wiley series in probability and mathematical statistics. — Un vol. relié, 16 × 23,5, de x, 296 p. — Prix: £24.95. — John Wiley, Chichester, 1991.

This edition represents an enlarged version of the 1st ed. which appeared in 1983 in the Teubner Publishing House in Leipzig. The volume includes new material on integral geometric prior distributions, nonlinear modifications of the conjugate Bayes estimator, Bayes and admissible linear estimation, Bayesian robustness measures and restricted minimax optimality and also on Bayes and minimax linear estimation in inadequate models. A completely new part is included on minimax linear regression estimation in case of prior knowledge representable by some restricted compact parameter set.

Peter HENRICI. — **Applied and computational complex analysis. Vol. 2.** — Wiley Classics Library edition. — Un vol. broché, 15 × 22,5, de ix, 662 p. — Prix: £30.65. — John Wiley, Chichester, 1991.

The Wiley Classics Library consists of selected books that have become recognized classics in their respective fields. *De la préface*: “In the present volume 2 of our three-volume work we continue to discuss algorithmic techniques that can be used to construct either exact or approximate solutions to problems in complex analysis. A focal point for these applications is the evaluation and manipulation of solutions of analytic differential equations. Successive chapters deal with the representation of solutions by series expansions, with the method of integral transforms, with asymptotic analysis, and with the representation of special solutions by continued fractions.”

Michèle AUDIN. — **The topology of torus actions on symplectic manifolds.** — Progress in mathematics, vol. 93. — Un vol. relié, 16 × 24, de 181 p. — Prix: SFr. 69.00. — Birkhäuser, Basel, 1991.

The main achievements of the 1980s in Hamiltonian torus actions (including the Atiyah-Guillemin-Sternberg convexity theorem and the Duistermaat-Heckmann formula) are presented in this work which evolved from a graduate course on symplectic geometry. As the author is a topologist, her presentation of the subject is rather original; the book dwells on basic topological methods (classical low dimensional topology, Morse theory, equivariant cohomology). An entire chapter presents more or less all the compact symplectic 4-manifolds endowed with symplectic group actions, and another presents the family of complex toric varieties from a very “symplectic” viewpoint.

Douglas R. SHIER. — **Network reliability and algebraic structures.** — Oxford Science Publications. — Un vol. relié, 16 × 24, de x, 144 p. — Prix: £22.50. — Clarendon Press/Oxford University Press, Oxford, 1991.

Networks of computer systems, distribution systems, and telecommunication systems play an increasingly important role in our lives. This book is concerned with analysing and assessing the reliability of such networks whose components are prone to possible failure. The field of network reliability has expanded rapidly to provide various mathematical models and computational procedures. In this book the emphasis is on identifying a number of algebraic structures that serve to unify the study of networks, and to suggest new techniques and

procedures for analysing the probabilistic behaviour of networks. Consequently, amongst the topics covered are pseudopolynomial algorithms, lattice structures, spaces of polynomials, reliability covering problems, and stochastic path problems.

**Handbook of numerical analysis. Vol. 2: Finite element methods (part 1).** — General editors: P.G. Ciarlet, J.L. Lions. — Un vol. relié, 17 × 24,5, de ix, 928 p. — Prix: US\$ 110.00/Dfl. 275.00. — North-Holland, Amsterdam, 1991.

This is the second in a series of volumes which will cover all the major aspects of Numerical Analysis, serving as a basic reference work on the subject. Each volume will concentrate on one, or two, particular topics and will be essentially self-contained. Each article, written by an expert, is an in-depth survey, reflecting the most recent trends in the field. Contents of volume II are: J.T. Oden: Finite elements: an introduction. P.G. Ciarlet: Basic error estimates for elliptic problems. L.B. Wahlbin: Local behavior in finite element methods. J.E. Roberts & J.M. Thomas: Mixed and hybrid methods. I. Babuska & J. Osborn: Eigenvalue problems. H. Fujita & T. Suzuki: Evolution problems.

N. BOURBAKI. — **Elements of mathematics. Algebra II: Chapters 4-7.** Translated by P.M. Cohn and J. Howie. — Un vol. relié, 18 × 24,5, de vii, 461 p. — Prix: DM 198.00. — Springer-Verlag, Berlin, 1990.

This book was originally published as “Algèbre, chapitres 4 à 7” in 1981. Chapters and contents are: Polynomials and rational fractions (Polynomials, zeros of polynomials, rational fractions, formal power series, symmetric tensors and polynomial mappings, symmetric functions); Commutative fields (Prime fields, extensions, algebraic extensions, algebraically closed extensions, p-radical extensions, étale algebra, separable algebraic extensions, norms and traces, conjugate elements and quasi-Galois extensions, Galois extensions, abelian extensions, finite fields, p-radical extensions of height smaller than 1, transcendental extensions, separable extensions, differential criteria of separability, regular extensions); Ordered groups and fields (Ordered groups and divisibility, ordered fields); Modules over principal ideal domains (Principal ideal domains, torsion modules over a principal ideal domain, free modules over a principal ideal domain, finitely generated modules over a principal ideal domain, endomorphisms of vector spaces).

Daniel REVUZ, Marc YOR. — **Continuous martingales and Brownian motion.** Grundlehren der mathematischen Wissenschaften, Band 293. — Un vol. relié, 16 × 24, de ix, 533 p. — Prix: DM 158.00. — Springer-Verlag, Berlin, 1991.

This work provides a detailed study of Brownian Motion, via the Itô stochastic calculus of continuous processes (diffusions, continuous semi-martingales). The emphasis is on methods, rather than generality. After a first introductory chapter, each of the subsequent ones introduces a new method or idea: stochastic integration, local times, excursions, weak convergence, and describes its applications to Brownian motion; some of these appear for the first time in book form. A large number of exercises give additional results and will help the reader master the subject more easily.

Arthur T. WINFREE. — **The geometry of biological time.** Springer study edition. — Un vol. broché, 16,5 × 24, de xiv, 530 p. — Prix: DM 68.00. — Springer-Verlag, Berlin, 1990.

The cycles of life are ultimately biochemical in mechanism but many of the principles that dominate their orchestration are common to diverse mechanisms. They are in essence mathematical principles. The first half of the book explains periodic processes in living systems

and their non-living analogues in the abstract terms of system theory. Emphasis is given to phase singularities, waves, and mutual synchronization in tissues composed of many clock-like units. The second half of the book is devoted to descriptions of the most commonly used experimental systems such as an electrical device built from many coupled oscillators, electrical oscillations and waves underlying nervous coordination, circadian clocks in fungi, fruitflies, and higher plants, etc.

William S. MASSEY. — **A basic course in algebraic topology.** — Graduate texts in mathematics, vol. 127. — Un vol. relié, 16 × 24, de xvi, 428 p. — Prix: DM 108.00. — Springer-Verlag, Berlin, 1991.

This textbook is intended for a course in algebraic topology at the beginning undergraduate level. The main topics covered are: the classification of compact 2-manifolds, the fundamental group, covering spaces, singular homology theory, and singular cohomology theory. The text consists of material from the first five chapters of the author's earlier book "Algebraic topology: an introduction" together with almost all of his book "Singular homology theory". The material of the two earlier books has been substantially revised, corrected, and brought up to date.

**Chemical graph theory: introduction and fundamentals.** — Ed. by Danail Bonchev and Dennis H. Rouvray. — Mathematical chemistry, vol. 1. — Un vol. relié, 15,5 × 23,5, de xii, 288 p. — Prix: US\$ 52.00. — Abacus Press, an imprint of Gordon & Breach, New York, 1991.

This volume presents the fundamentals of graph theory and then goes on to discuss specific chemical applications. It also contains a detailed discussion of the relevance of graph-theoretical polynomials: it describes methodologies for the enumeration of isomers, incorporating the classical Polya method, as well as more recent approaches. The final chapter considers the interplay between graph theory and molecular orbital theory from the standpoint of graph spectral theory, highlighting the concept of topological resonance in molecular species.

André WEIL. — **Souvenirs d'apprentissage.** — Vita mathematica, vol. 6. — Un vol. relié, 15,5 × 23, de 201 p. — Prix: SFr. 78.00. — Birkhäuser, Basel, 1991.

L'auteur, mathématicien, mais dont l'horizon ne s'est jamais borné aux mathématiques, évoque ici les souvenirs d'une carrière qui l'a mené dans plusieurs continents: Italie et Allemagne d'abord, puis l'Inde où il rencontra Gandhi et J. Nehru; l'U.R.S.S.; Princeton; la prison, en Finlande où il fut pris pour un espion soviétique, puis la France où il fut condamné pour avoir tenté de se soustraire à ses obligations militaires; l'Angleterre, l'Amérique puis le Brésil. A travers ces épisodes s'est déroulé un destin de mathématicien dont l'un des points saillants fut sa participation à la fondation du groupe Bourbaki.

M.A. TSFASMAN and S.G. VLADUT. — **Algebraic-geometric codes.** — Mathematics and its applications (Soviet series), vol. 58. — Un vol. relié, 17 × 24,5, de xxiv, 667 p. — Prix: Dfl. 340.00/US\$ 229.00/£ 118.00. — Kluwer Academic Publishers, Dordrecht, 1991.

This is the first textbook to present a comprehensive treatment of the recently emerged area which combines algebraic geometry and coding theory. Starting from essentially first principles, the text leads the reader to the most recent published and unpublished results. Moreover, problems and hints for their solutions are included, as well as many open problems. This book will be of use to mathematicians interested in coding theory, algebraic geometry and algebraic number theory, sphere packings and lattices, and computational complexity.

**Nonparametric functional estimation and related topics.** — Edited by George Roussas. — NATO ASI series. Series C: mathematical and physical sciences, vol. 335. — Un vol. relié, 16,5 × 24,5, de XIII, 708 p. — Prix: Dfl. 350.00/US\$215.00/£121.00. — Kluwer Academic Publishers, Dordrecht, 1991.

This book includes the proceedings of the NATO Advanced Study Institute on Nonparametric Functional Estimation and Related topics, Spetses, Greece, July 29-August 10, 1990. Nonparametric functional estimation is a central topic in statistics, with applications in numerous substantive fields in mathematics, natural and social sciences, engineering and medicine. Modified versions of 51 of the presented lectures are assembled here and are grouped in six distinct subtitles labeled as: curve and functional estimation; parameter selection, smoothing; regression models; dependant data; time series analysis; signal detection; and various topics.

John H. HUBBARD, Beverly H. WEST. — **Differential equations: a dynamical systems approach, part I: ordinary differential equations.** — Texts in applied mathematics, vol. 5. — Un vol. relié, 16,5 × 24,5, de XIX, 348 p. — Prix: DM 78.00. — Springer-Verlag, New York, 1991.

“Traditional courses on differential equations focus on techniques leading to solutions. Unfortunately, most differential equations do not admit solutions which can be written in elementary terms. We take the view that a differential equation defines functions; the object of the theory is to understand the behavior of these functions. Our tools include qualitative and numerical methods besides the traditional analytic methods. The companion software, MacMath, is designed to bring these notions to life. An extensive chapter is devoted to iteration; this topic is closely related to differential equations, and our approach emphasizes the similarities.”

Pankaj K. AGARWAL. — **Intersection and decomposition algorithms for planar arrangements.** — Un vol. relié, 16 × 23,5, de XVII, 277 p. — Prix: £22.50/US\$39.50. — Cambridge University Press, Cambridge, 1991.

This book presents a study of various problems related to arrangements of lines, segments, or curves in the plane. It starts with a discussion of Davenport-Schinzel sequences. The main result here establishes almost tight bounds on the maximal length of  $(n, s)$ -Davenport-Schinzel sequences. The second problem studied is: given a collection of “red” Jordan arcs and another of “blue” arcs, determine whether any red arc intersects any blue arc. Some fast deterministic algorithms are presented, along with applications to many other problems, including collision detection. Next, a partitioning algorithm is presented that improves the time complexity of a variety of problems involving lines or segments in the plane. Several applications are discussed, most importantly a fast deterministic algorithm to construct a family of spanning trees with low stabbing number.

**Advances in probability distributions with given marginals.** — Ed. by G. Dall’Aglia, S. Kotz and G. Salinetti. — Mathematics and its applications, vol. 67. — Un vol. relié 16,5 × 24,5, de XVIII, 231 p. — Prix: Dfl. 145.00/US\$94.00/£49.50. — Kluwer Academic Publishers, Dordrecht, 1991.

This volume contains the invited papers presented at the Symposium on Distributions with Given Marginals which was held in Rome in April 1990. This collection of papers provides an excellent and authoritative overview of the subject from its inception in the 1950s with the

original work of Fréchet to the most recent results which generalize the initial concepts and demonstrate developments toward applications.

Eric GOLES and Servet MARTINEZ. — **Neural and automata networks: dynamical behavior and applications.** — Mathematics and its applications, vol. 58. — Un vol. relié,  $16,5 \times 24,5$ , de XIII, 250 p. — Prix: Dfl. 140.00/US\$69.00/£49.00. — Kluwer Academic Publishers, Dordrecht, 1991.

This volume provides a broad mathematical framework for the study of automata and neural networks. The main theoretical tools developed are Lyapunov functionals which enable the description of limit orbits and the determination of bounds for transient lengths. Applications to models in statistical physics are presented.

Helmut KOCH. — **Introduction to classical mathematics I: from the quadratic reciprocity law to the uniformization theorem.** — Mathematics and its applications, vol. 70. — Un vol. relié,  $16,5 \times 24,5$ , de XVII, 453 p. — Prix: Dfl. 240.00/US\$149.00/£83.00. — Kluwer Academic Publishers, Dordrecht, 1991.

This volume provides an overview of the classical mathematics of the 19th and first half of the 20th centuries. Motivation, especially the original motivation, is a prime concern and so is clarity and, consequently, proofs and discussions are in terms of modern concepts and ideas. The order of the contents follows historical development, beginning with Gauss's "Disquisitiones Arithmeticae" and ending with the "Idee der Riemannschen Fläche" of Weyl. Some of the major topics presented here are Gauss's work on number theory and differential geometry, Dirichlet's work on harmonic analysis and prime numbers and their distribution, Galois' Mémoire on the theory of algebraic equations, Riemann's work on function theory and differential geometry ... etc.

N. KORNEICHUK. — **Exact constants in approximation theory.** — Encyclopedia of mathematics and its applications, vol. 38. — Un vol. relié,  $16 \times 24$ , de XII, 452 p. — Prix: £50.00/US\$89.50. — Cambridge University Press, Cambridge, 1991.

This book can be regarded as an introduction for non-specialists or as a reference work for experts, to the particular area of approximation theory that is concerned with exact constants; the results apply mainly to extremal problems in approximation theory, which in turn are closely related to numerical analysis and optimization. Topics included are: best approximation by polynomials and splines; linear approximation methods, such as spline-approximation; optimal reconstruction of functions and linear functionals. Many of the results are based on deep facts from analysis and function theory, such as duality theory and comparison theorems.

Max-Albert KNUS. — **Quadratic and Hermitian forms over rings.** — Grundlehren der mathematischen Wissenschaften und ihrer Grenzgebiete, Band 294. — Un vol. relié,  $16 \times 24$ , de XI, 524 p. — Prix: DM 198.00 — Springer-Verlag, Berlin, 1991.

This book presents the theory of quadratic and hermitian forms over rings in a very general setting. It avoids, as far as possible, any restriction on the characteristic and takes full advantage of the functorial properties of the theory. It is not encyclopedic survey. It stresses the algebraic aspects of the theory and avoids overlapping with other books on quadratic forms (like those of Lam, Milnor-Husemöller and Scharlau). One important tool is descent theory with the corresponding cohomological machinery. It is used to define the classical invariants of quadratic forms, but also for the study of Azmaya algebras. Another important tool is algebraic  $K$ -theory, which plays the role that linear algebra plays in the case of forms over fields.

**Symplectic geometry, groupoids, and integrable systems: séminaire sud-rhodanien de géométrie à Berkeley (1989).** — P. Dazord, A. Weinstein, editors. — Mathematical Sciences Research Institute Publications, vol. 20. — Un vol. relié, 16 × 24, de XI, 311 p. — Prix: DM 98.00. — Springer-Verlag, New York, 1991.

De la préface: “The papers in this volume are based on lectures given during the meeting ... organized at MSRI from May 22 to June 2, 1989, as part of a year-long program on Symplectic Geometry and Mechanics... Through its international meetings... the Séminaire Sud-Rhodanien de Géométrie has become an important center of exchange for the latest developments in symplectic geometry and its applications... Among the subjects discussed at the meeting, a special role was given to the theory of “symplectic groupoids”, which has been since 1987 the subject of a fruitful collaboration involving geometers from Berkeley, Lyon, and Montpellier...”

**Neue Mathematik: Olympiadeaufgaben.** — Hrsg. von Wolfgang Engel, Udo Pirl. — Un vol. relié, 17 × 23,5, de 348 p. — Prix: DM 32.00. — Aulis Verlag Deubner & Co., Köln, 1990.

Diese Sammlung von 321 der schönsten Aufgaben aus den Mathematik-Olympiade-Aufgaben der ehemaligen DDR begeistert im Unterricht nicht nur die Zielgruppe der 14- bis 18-jährigen Schüler und Schülerinnen. Dank des unterschiedlichen Schwierigkeitsgrades der Aufgaben kann das Buch als zusätzliche Aufgabensammlung für den Unterricht oder in der Lehrerbildung, aber auch in mathematischen Arbeitsgemeinschaften dienen.

Stan WAGON. — **MATHEMATICA in action.** — Un vol. broché, 20 × 23,5, de XIV, 419 p. — Prix: £21.95. — W.H. Freeman, New York (distr. en Europe par Marston Book Services, Oxford), 1991.

De la préface: “This book is an example-based introduction to techniques, both elementary and advanced, of using “Mathematica”, a revolutionary tool for mathematical computation and exploration. By integrating the basic functions of mathematics with a powerful ... programming language, “Mathematica” allows users to carry out projects that would be extremely laborious in traditional programming environments. “Mathematica in action” illustrates this power by using animations, 3-dimensional graphics, high-precision number theory computations, and a variety of other methods to attack a diverse collection of problems...”

**Frontiers in pure and applied mathematics.** — A collection of papers dedicated to Jacques-Louis Lions on the occasion of his sixtieth birthday. — Edited by Robert Dautray. — Un vol. relié, 17 × 24,5, de XXIV, 286 p. — Prix: US\$108.50/Dfl. 190.00. — North-Holland, Amsterdam, 1991.

The sixtieth birthday of the eminent mathematician, Jacques-Louis Lions, was celebrated in Paris with a gathering of his friends from the scientific community all over the world. Several hundred scientists met for a week at the Sorbonne and nineteen of the lectures they delivered have been collected in this unique volume, which is an investigation of the frontiers of mathematics.

Ralph HENSTOCK. — **The general theory of integration.** — Oxford mathematical monographs. — Un vol. relié, 16,5 × 24,5, de XI, 262 p. — Prix: £40.00. — Clarendon Press, Oxford, 1991.

Introduction and prerequisites. — Division systems and division spaces. — Generalized Riemann and variational integration in division systems and division spaces. — Limits under



the integral sign, functions depending on a parameter. — Differentiation. — Cartesian products of a finite number of division systems (spaces). — Integration in infinite-dimensional spaces. — Perron-type, Ward-type, and convergence-factor integrals. — Functional analysis and integration theory.

Yuri I. MANIN. — **Topics in noncommutative geometry.** — M.B. Porter lectures, Rice University, Department of Mathematics. — Un vol. relié,  $16,5 \times 24,5$ , de 163 p. — Prix: £35.00. — Princeton University Press, Princeton, N.J., 1991.

Yuri Manin addresses a variety of instances in which the application of commutative algebra cannot be used to describe geometric objects, emphasizing the recent upsurge of activity in studying non commutative rings as if they were function rings “on noncommutative spaces”. Manin begins by summarizing and giving examples of some of the ideas that led to the new concepts of noncommutative geometry. He then discusses supersymmetric algebraic curves that arose in connection with superstring theory; examines superhomogeneous spaces, their Schubert cells, and superanalogues of Weyl groups; and provides an introduction to quantum groups.

**Inequalities: fifty years on from Hardy, Littlewood and Polya.** — Proceedings of the International Conference, London Mathematical Society. — Ed. by W. Norrie Everitt. — Lecture notes in pure and applied mathematics, vol. 129. — Un vol. broché,  $17,5 \times 25,5$ , de IX, 283 p. — Prix: US\$99.75 (USA et Canada)/US\$119.50 (autres pays). — Marcel Dekker, New York, 1991.

This compendium reports on many mainstream developments in variational, isoperimetric, differential, operator, norm, and integral inequalities and considers their potential uses in function theory, ordinary and partial differential equations, and mathematical physics. Continuing the tradition of excellence established in “Inequalities” (a landmark mathematics reference by G.H. Hardy, J.E. Littlewood and G. Polya) and including recent work in the field, this collection reviews progress in using classical inequalities to research stationary states in quantum mechanics and equilibrium states in quantum statistical mechanics, discusses and compares norm inequalities of product from relating a function and two of its derivatives, etc.

James FORAN. — **Fundamentals of real analysis.** — Pure and applied mathematics, vol. 144. — Un vol. relié,  $16 \times 23,5$ , de XII, 473 p. — Prix: US\$59.75. — Marcel Dekker, New York, 1991.

Based on a two-semester course in real analysis, this textbook explains fundamentals of the theory of functions of a real variable, including subsets of the line, the theory of measure, the Lebesgue integral and its relationship to the derivative, and Denjoy-Perron and Denjoy integrals.

F.A. BEREZIN and M.A. SHUBIN. — **The Schrödinger equation.** — Mathematics and its applications (Soviet series), vol. 66. — Un vol. relié,  $16,5 \times 24,5$ , de XVII, 555 p. — Prix: Dfl. 395.00/US\$249.00/£136.00. — Kluwer Academic Publishers, Dordrecht, 1991.

This volume deals with topics of mathematical physics associated with the study of Schrödinger equation. Although written primarily for mathematicians who wish to gain a better awareness of the physical aspects of quantum mechanics and related topics, it will also be useful for mathematical physicists who wish to become better acquainted with the mathematical formalism of quantum mechanics. Much of the material included here has been based on lectures given by the authors at Moscow State University, and this volume can also be

recommended as a supplementary graduate level introduction to the spectral theory of differential operators with both discrete and continuous spectra.

V.A. MALYSHEV and R.A. MINLOS. — **Gibbs random fields: cluster expansions.** — Mathematics and its applications (Soviet series), vol. 44. — Un vol. relié,  $16,5 \times 24,5$ , de XIV, 248 p. — Prix: Dfl. 190.00/US\$ 119.00/£66.00. — Kluwer Academic Publishers, Dordrecht, 1991.

This volume contains the first complete presentation of the method of cluster expansion, which is of the most powerful methods of investigation of Gibbs random fields. This method yields expressions for local random field characteristics in terms of expansions depending only on a finite set of random field variables.

Stanislaw WALUKIEWICZ. — **Integer programming.** — Mathematics and its applications (East European series), vol. 46. — Un vol. relié,  $16,5 \times 24,5$ , de XVI, 182 p. — Prix: Dfl. 140.00/US\$ 69.00/£49.00. — Kluwer Academic Publishers, Dordrecht, 1991.

This volume presents the theory and methodology of integer programming in a unified way. Recent results are included, and examples are given showing how these results may be used in the construction of more efficient numerical methods. In contrast to other books on integer programming, the notions of equivalence and relaxation of integer programming problems are used consistently here. This approach allows the introduction of simpler notations and leads to more concise considerations.

Taqdir HUSAIN. — **Orthogonal Schauder bases.** — Pure and applied mathematics, vol. 143. — Un vol. relié,  $16 \times 23,5$ , de XVII, 283 p. — Prix: £99.75 (U.S.A. and Canada), £119.50 (Tous les autres pays). — Marcel Dekker, Inc., New York, 1991.

This volume presents a cohesive and cumulative account of recent research on orthogonal bases in topological algebras, offering a new abstract perspective on several classical algebras used in analysis. Gathering information from numerous journals and unpublished sources, the book also provides known results on topological vector spaces and their bases, discloses useful findings on Banach and other topological algebras, introduces orthogonal, semiorthogonal, quasiorthogonal, and preorthogonal bases to obtain an optimal generality in some results, discusses the structure of a topological algebra when its orthogonal basis is unconditional ... and more.

Gerd FALTINGS, Ching-Li CHAI. — **Degeneration of Abelian varieties.** — Ergebnisse der Mathematik und ihrer Grenzgebiete. 3. Folge, Bd. 22. — Un vol. relié,  $17 \times 25$ , de XII, 316 p. — Prix: DM 78.00. — Springer-Verlag, Berlin, 1990.

This book presents a complete treatment of semi-abelian degenerations of abelian varieties, and their application to the construction of arithmetic compactifications of Siegel moduli space. Most results are new and have never been published before. Highlights of the book include a classification of semi-abelian schemes, construction of the toroidal and the minimal compactification over the integers, heights for abelian varieties over number fields, and Eichler integrals in several variables. The book also provides a new approach to Siegel modular forms. This work should serve as a valuable reference source for researchers and graduate students interested in algebraic geometry, Shimura varieties, or diophantine geometry.

A.I. KOSTRIKIN. — **Around Burnside.** — Translated from the Russian by James Wiegold. — *Ergebnisse der Mathematik und ihrer Grenzgebiete. 3. Folge, Bd. 20.* — Un vol. relié, 17 × 25, de XII, 220 p. — Prix: DM 158.00. — Springer-Verlag, Berlin, 1990.

This a truly encyclopaedic survey of the various aspects of the “restricted Burnside problem” and its surprising applications. Among many other things, it contains a detailed positive solution of the restricted Burnside problem for prime exponent, via Engel Lie algebras and so-called sandwiches. A new appendix to this translation contains a proof by E.I. Zel’manov of the existence of a recursive upper bound for the nilpotency class of a  $d$ -generator finite group of prime exponent  $p$ . Informative and illustrative comments grace the end of each chapter, and there is an extensive bibliography.

Craig SMORYNSKI. — **Logical number theory, vol. 1: an introduction.** — Universitext. — Un vol. broché, 16,5 × 24, de X, 405 p. — Prix: DM 68.00. — Springer-Verlag, Berlin, 1991.

Number theory as studied by the logician is the subject matter of the book. This first volume can stand on its own as a somewhat unorthodox introduction to mathematical logic for undergraduates, dealing with the usual introductory material: recursion theory, first-order logic, completeness, incompleteness, and undecidability. In addition, its second chapter contains the complete logical discussion of Diophantine decision problems available anywhere, taking the reader right up to the frontiers of research. The first and third chapters also offer greater depth and breadth in logico-arithmetical matters than can be found in existing logic texts.

Reinhold REMMERT. — **Funktionentheorie II.** — *Grundwissen Mathematik, Bd. 6.* — Un vol. broché, 16,5 × 24, de XIX, 299 p. — Prix: DM 58.00. — Springer-Verlag, Berlin, 1991.

Schwerpunkte dieses Bandes bilden der Produktsatz von Weierstrass, der Satz von Mittag-Leffler, der Riemannsche Abbildungssatz und die Approximationstheorie von Runge. Daneben finden sich aber auch Besonderheiten wie der Satz von Iss’sa, die Idealtheorie der holomorphen Einbettung des Einheitskreises in den  $C^3$ . Einen Leckerbissen bietet das achte Kapitel: hier wird das Gauss’sche Gutachten über Riemanns Dissertation vorgestellt. Anders als im ersten Band werden häufig Ausblicke auf die Funktionentheorie mehrerer komplexer Veränderlicher gegeben.

**Symmetries and singularity structures : integrability and chaos in nonlinear dynamical systems.** — Proceedings of the Workshop, Bharathidasan University, Tiruchirapalli, India, November 29-December 2, 1989. — Edited by M. Lakshmanan, M. Daniel. — Research reports in physics. — Un vol. broché, 16,5 × 24, de VIII, 208 p. — Prix: DM 98.00. — Springer-Verlag, Berlin, 1990.

These lectures deal with background and latest developments in symmetries, singularity structures (Painlevé analysis) and their relation to integrability and chaos in classical and quantum nonlinear dynamical systems. The book is useful to both newcomers and senior researchers in physics and mathematics working in the field of nonlinear dynamics. Starting from simple Lie symmetries the role of generalized Lie and Lie-Bäcklund symmetries and the underlying algebras associated with a wide spectrum of nonlinear systems are studied.

A.V. SKOROHOD. — **Random processes with independent increments.** — Mathematics and its applications (Soviet series), vol. 47. — Un vol. relié, 17 × 24,5, de XI, 279 p. — Prix: Dfl. 190.00/US\$ 118.00/£65.00. — Kluwer Academic Publishers, Dordrecht, 1991.

This volume presents an account of the results obtained in the theory of random processes with independent increments. The construction of such processes is studied, and the local properties of trajectories and the asymptotics of their behaviour are investigated. An appraisal is also given of the methods employed for determining their main probabilistic characteristics. The generalization of the concept of a process with independent increments onto some operator groups and semi-groups which arise when dynamical systems are subject to the influence of random perturbations is also studied.

Herbert FLEISCHNER. — **Eulerian graphs and related topics, part 1, vol. 2.** — *Annals of discrete mathematics*, vol. 50. — Un vol. relié, 17 × 24,5, de x, 326 p. — Prix: US\$100.00/Dfl. 175.00. — North-Holland, Amsterdam, 1991.

The two volumes comprising part 1 of this work embrace the theme of eulerian trails and covering walks. They contain enough material for an undergraduate or graduate graph theory course which emphasizes eulerian graphs, and thus can be read by any mathematician not familiar with graph theory. But they are also of interest to researchers because they contain many recent results, some of which are only partial solutions to more general problems. A number of conjectures have been included as well. Various problems are also addressed algorithmically. Vol. 2 of part 1 contain three chapters: Various types of closed covering walk; Eulerian trails — how many?; Algorithms for Eulerian trails and cycle decompositions, maze search algorithms.

A.N. KOLMOGOROV. — **Selected works, vol. 1: Mathematics and mechanics.** — Edited by V.M. Tikhomirov. — *Mathematics and its applications*, (Soviet series), vol. 25. — Un vol. relié, 17 × 25, de XIX, 551 p. — Prix: Dfl. 360.00/US\$199.00/£120.00. — Kluwer Academic Publishers, Dordrecht, 1991.

This is the first of three volumes devoted to the work of A.N. Kolmogorov (1903-1987), one of the most prominent 20th-century mathematicians. It contains papers in mathematics (excluding probability theory and information theory, which are the subject of the following two volumes), turbulence and classical mechanics. The material appearing in each volume was selected by A.N. Kolmogorov himself and is accompanied by short introductory notes and commentaries. All papers appeared in English.

Boris N. APANASOV. — **Discrete groups in space and uniformization problems.** — *Mathematics and its applications* (Soviet series), vol. 40. — Un vol. relié, 17 × 25, de XVII, 482 p. — Prix: Dfl. 295.00/US\$193.00/£99.00. — Kluwer Academic Publishers, Dordrecht, 1991.

Emphasis is placed on the geometrical aspects and on the universal constraints which must be satisfied by all tessellations and structures on manifolds. The book treats in nine chapters of the following topics: Conformal mappings, geometrical structures on manifolds, general properties of discontinuous groups, discrete groups of hyperbolic isometries, geometrically finite discrete Möbius groups, geometric and algebraic structures of discrete groups, Kleinian manifolds, uniformization of manifolds, and deformation spaces of groups and structures.

Michal KISIELEWICZ. — **Differential inclusions and optimal control.** — *Mathematics and its applications* (East European series), vol. 44. — Un vol. relié, 16 × 24,5, de XIX, 240 p. — Prix: Dfl. 210.00/US\$124.00/£77.00. — Kluwer Academic Publishers, Dordrecht, 1991.

This volume contains a new approach to the theory of neutral functional-differential inclusions and presents some applications in the theory of optimal control. The main results

concerning the properties of neutral functional-differential inclusions are obtained as consequences of the properties of subtrajectory integrals of their right-hand sides. This approach enables general functional-differential inclusions to be reduced to some functional inclusions in the Banach space of all Lebesgue integrable functions considered both with strong and weak topology.

**Applications of Fibonacci numbers, vol. 4.** — Proceedings of the Fourth International Conference on Fibonacci Numbers and Their Applications, Wake Forest University, N.C., U.S.A., July 30-August 3, 1990.— Edited by G.E. Bergum, A.N. Philippou and A.F. Horadam. — Un vol. relié,  $17 \times 24,5$ , de xxiv, 313 p. — Prix: Dfl. 180.00/US\$99.00/£61.00. — Kluwer Academic Publishers, Dordrecht 1991.

This volume presents a selection of papers which covers the following topics: Number patterns, linear recurrences and the application of the Fibonacci numbers to probability, statistics, differential equations, cryptography, computer science and elementary number theory. Many of the papers included contain suggestions for other avenues of research.

D.S. MITRINOVIC, J.E. PECARIC, A.M. FINK. — **Inequalities involving functions and their integrals and derivatives.** — Mathematics and its applications (East European series), vol. 53. — Un vol. relié,  $16,5 \times 24,5$ , de xvi, 587 p. — Prix: Dfl. 280.00/US\$149.00/£95.00. — Kluwer Academic Publishers, Dordrecht, 1991.

This volume provides a comprehensive, up-to-date survey of the subject. Some chapters of the book are devoted to specific inequalities such as those of Kolmogorov-Landau, Wirtinger, Hardy, Carlson, Hilbert, Caplygin, Lyapunov, Gronwell and others. Over 800 references to the literature are cited; proofs are given when these provide insight into the general methods involved; and applications especially to the theory of differential equations, are mentioned when appropriate.

**Numerical grid generation in computational fluid dynamics and related fields.** — Proceedings of the 3rd International Conference on Numerical Grid Generation in Computational Fluid Dynamics and Related Fields, Barcelona, Spain, 3-7 June, 1991. — Edited by A.S.-Arcilla, J. Häuser, P.R. Eiseman, J.F. Thompson. — Un vol. relié,  $17 \times 24,5$ , de xv, 996 p., avec 20 planches en couleur. — Prix: US\$185.00/Dfl. 325.00. — North-Holland, Amsterdam, 1991.

This proceedings is the result of the increasing interest in the development and application of grid generation techniques in computational fluid dynamics (CFD) and related fields. The use of these techniques, formerly restricted to research and specialist organizations, is becoming more widespread due to significant advances in hardware and software technology. This conference series was started in 1986 to serve as an internationally acknowledged forum for researchers in the — at the time — novel and emerging field of grid generation techniques applied to CFD. This edition contain papers covering a wide spectrum of methods and techniques, both theoretical and applied, contributing to the scientific advance of this field.

Rolando CHUAQUI. — **Truth, possibility and probability : new logical foundations of probability and statistical inference.** — North-Holland mathematics studies, vol. 166. — Un vol. relié,  $17,5 \times 24,5$ , de xvii, 484 p. — Prix: US\$128.00/Dfl. 225.00. — North-Holland, Amsterdam, 1991.

Anyone involved in the philosophy of science is naturally drawn into the study of the foundations of probability. Different interpretations of probability, based on competing

philosophical ideas, lead to different statistical techniques, and frequently to mutually contradictory consequences. This unique book presents a new interpretation of probability, rooted in the traditional interpretation that was current in the 17th and 18th centuries. Mathematical models are constructed based on this interpretation, and statistical inference and decision theory are applied, including some examples in artificial intelligence, solving the main foundational problems. Nonstandard analysis is extensively developed for the construction of the models and in some of the proofs.

**Representation theory of finite groups and finite-dimensional algebras.** — Proceedings of the Conference at the University of Bielefeld from May 15-17, 1991, and 7 survey articles on topics of representation theory. — Edited by G.O. Michler, C.M. Ringel. — Progress in mathematics, vol. 95. — Un vol. relié, 16 × 24, de ix, 520 p. Prix: SFr. 94.00. — Birkhäuser, Basel, 1991.

This volume contains seven survey articles covering the work discussed during several meetings sponsored by the German Research Council from 1984 to 1991. The work of the German research groups is presented in detail as well as important developments of other researchers around the world. The authors are: B. Fischer, B. Huppert, K. Lux, H. Pahlings, B.H. Matzat, G.O. Michler, C.M. Ringel, K.W. Roggenkamp. The topics considered are the ordinary and the modular representation theory of groups, the representation theory of finite-dimensional algebras, the isomorphism problem for integral group rings and applications to Galois theory. The 2nd part of the volume contains 17 research papers which were presented at the final conference, including lectures by M. Auslander, J.A. Green, M. Isaacs, and J.C. Jantzen.

**The algebraic theory of superselection sectors : introduction and recent results.** — Proceedings of the Convegno internazionale, Istituto scientifico internazionale G.B. Guccia, Palermo (Italy), November 23 — 30, 1989. — Editor: Daniel Kastler. — Un vol. relié, 16 × 22,5, de viii, 604 p. — World Scientific, Singapore, 1990.

From the preface: “Algebraic quantum field theory is based on the claim that the whole physical content of a relativistic quantum field theory is encoded in the local net structure of the algebra of (gauge invariant) observables. The algebraic theory of superselection sectors (created by Doplicher, Haag and Roberts in the early seventies after seminal work of Borchers) implement this claim to the extent of extracting the statistics of unobservable fields from the data of the local net of observables — this in a variety of situations including e.g. the massive sectors of gauge fields theories and the two-dimensional conformally invariant field theories... The aim of this book is to offer an ab initio access to the latest developments in the algebraic theory of superselection sectors.

Pierre-Denis METHÉE. — **Les mathématiques à l'Académie et à la Faculté des sciences de Lausanne.** — Etudes et documents pour servir à l'histoire de l'Université de Lausanne, vol. 29. — Un vol. broché, 16 × 23,5, de 166 p. — Prix: SFr. 35.00. — Université de Lausanne, Lausanne, 1991.

Cet ouvrage qui paraît à l'occasion du centième anniversaire de la transformation de l'Académie de Lausanne en Université, retrace les principales étapes de l'évolution des mathématiques «académiques» et commente l'apport des savants et enseignants illustres qui y ont contribué. On y retrouve Jean-Pierre de Crousaz, Jean Gay et Jules Marguet ainsi que Georges de Rham. Les enseignants actuels y présentent leurs domaines d'intérêt et de recherche. Des extraits de documents officiels, de lettres, de journaux ou de revues scientifiques ajoutent une note anecdotique à cet ouvrage destiné à un large public.

Ernst HAIRER, Gerhard WANNER. — **Solving ordinary differential-algebraic problems, vol. 2: Stiff and differential-algebraic problems.** — Springer series in computational mathematics, vol. 14. — Un vol. relié, 16 × 24, de xv, 601 p. — Prix: DM 128.00. — Springer-Verlag, Berlin, 1991.

The subject of this book is the solution of stiff differential equations and of differential-algebraic systems (differential equations with constraints). There is a chapter on one-step and extrapolation methods for stiff problems, another one on multistep methods and general linear methods for stiff problems, and a third one on the treatment of singular perturbation problems and differential-algebraic systems. The beginning of each chapter is of an introductory nature, followed by practical applications, the discussion of numerical results, theoretical investigations on the order of accuracy, linear and nonlinear stability, convergence and asymptotic expansions. As stiff and differential-algebraic problems arise everywhere in scientific computations, many applications as well as computer programs are presented.

Hallard T. CROFT, Kenneth J. FALCONER, Richard K. GUY. — **Unsolved problems in geometry. Problem books in mathematics.** — Unsolved problems in intuitive mathematics, vol. 2. — Un vol. relié, 16 × 24, de xv, 198 p. — Prix: DM 84.00. — Springer-Verlag, New York, 1991.

Mathematicians and non-mathematicians alike have long been fascinated by geometrical problems, particularly those that are intuitive in the sense of being easy to state, perhaps with the aid of a simple diagram. Each section in the book describes a problem or a group of related problems. Usually the problems are capable of generalization or variation in many directions. The book can be appreciated at many levels and is intended for every one from amateurs to research mathematicians.

Pierre DUHEM. — **The origins of statics.** — Translated by G.F. Leneaux, V.N. Vagliente, and G.H. Wagener. — Boston studies in the philosophy of science, vol. 123. — Un vol. relié, 16 × 22,5 de xxxv, 593 p. — Prix: Dfl. 295.00/£99.00. — Kluwer Academic Publishers, Dordrecht, 1991.

Pierre Duhem's historical writings remain the single most significant works read routinely by historians of science and those interested in the origins of science. Duhem showed that an unsuspected continuity existed between the scientific works of ancient Greece and those of the 16th century. He essentially discovered the existence of science in the Middle Ages and showed that medieval texts contained the origins of many scientific concepts. Although known to other historians of science, it was Duhem who understood the significance of these writings, and who placed them in their proper perspective.

Hans LAUWERIER. — **Fractals: endlessly repeated geometrical figures.** — Princeton Science Library. — Un vol. broché, 14 × 21,5 de xiv, 209 p. — Prix: US\$49.50 (relié)/US\$14.95 (broché). — Princeton University Press, Princeton, N.J., 1991.

No longer mathematical curiosities, fractals are now a vital subject of mathematical study, practical application, and popular interest. For readers interested in graphic design, computers, and science and mathematics in general, Hans Lauwerier provides an accessible introduction to fractals that makes only modest use of mathematical techniques.

Armand BOREL. — **Linear algebraic groups.** — Second enlarged edition. — Graduate texts in mathematics, vol. 126. — Un vol. relié, x, 288 p. — Prix: DM 98.00. — Springer-Verlag, Berlin, 1991.

This book is a revised and enlarged edition of «Linear algebraic groups», published by W.A. Benjamin in 1969. It presents foundational material on algebraic groups, Lie algebras, transformation spaces, and quotient spaces. This second edition has been expanded to include material on central isogenies and the structure of the groups of rational points of an isotropic reductive group.

David J. SAVILLE, Graham R. WOOD. — **Statistical methods: the geometric approach.** — Springer texts in statistics. — Un vol. relié,  $16 \times 24$ , de xvi, 560 p. — Prix: DM 98.00. — Springer-Verlag, Berlin, 1991.

This text is a novel exposition of the traditional workhorses of statistics: analysis of variance and regression. It presents this core material in a consistent visual way. The approach is based on the geometric methods used by the founder of modern-day statistics, Sir Ronald Fisher. The text uses geometry to link the statistical methods of the underlying mathematics, while real-life case studies link theory and practice. Each new situation is introduced by a detailed analysis of a case study, including assumption checking and presentation of results.

Julii A. DUBINSKII. — **Analytic pseudo-differential operators and their applications.** — Mathematics and its applications (Soviet series), vol. 68. — Un vol. relié,  $16,5 \times 24,5$ , de xii, 252 p. — Prix: Dfl. 175.00/US\$ 98.00/£ 59.00. — Kluwer Academic Publishers, Dordrecht, 1991.

This book is devoted to the theory of analytic partial differential (PD) operators with several complex arguments and their applications to a variety of problems of partial differential equations and mathematical physics. Main topics considered are: PD-operators with constant analytic symbols, the Cauchy problem in the complex domain, PD-operators with real arguments.

E. HLAWKA, J. SCHOISSENGEIER, R. TASCHNER. — **Geometric and analytic number theory.** — Universitext. — Un vol. broché,  $16,5 \times 24,5$ , de x, 238 p. — Prix: DM 48.00. — Springer-Verlag, Berlin, 1991.

Based on lectures given by Prof. Hlawka in Vienna and in Pasadena, the book covers diophantine approximation, uniform distribution of numbers modulo 1 and geometry of numbers, as well as analytic number theory. It also proves the irrationality of zeta (3) and presents the important method of A. and H. Lenstra for the decomposition of polynomials.

Serge ALINHAC, Patrick GÉRARD. — **Opérateurs pseudo-différentiels et théorème de Nash-Moser.** — Savoirs actuels. — Un vol. broché,  $16 \times 23$ , de 188 p. — InterEditions/Editions du CNRS, Paris/Meudon, 1991.

Introduits il y a 25 ans, les opérateurs pseudo-différentiels sont devenus un outil de base dans les domaines des équations aux dérivées partielles et de l'analyse sur les variétés. Ils permettent de porter un regard neuf sur la puissante méthode de perturbation due à Nash et à Moser, qui, de la géométrie aux mathématiques appliquées, reste au coeur de nombreuses études. Cet ouvrage présente ces deux importantes théories en examinant comment elles sont liées l'une à l'autre. Sont successivement abordés, l'analyse microlocale, la théorie de Littlewood-Paley, les inégalités d'énergie pour les équations hyperboliques et les théorèmes de fonctions implicites.

J.B. GRIFFITHS. — **Colliding plane waves in general relativity.** — Oxford mathematical monographs. — Un vol. relié,  $16,5 \times 24$ , de xiv, 232 p. — Prix: £25.00. — Clarendon Press, Oxford, 1991.



De la préface: "... In practice, one of the great difficulties of relating the particular features of general relativity to real physical problems, arises from the high degree of non-linearity of the field equations. Although the linearized theory has been used in some applications, its use is severely limited. Many of the most interesting properties of space-time, such as the occurrence of singularities, are consequences of the non-linearity of the equations. In this book, we will be considering one of the most obvious situations in which the effects of the non-linearity of Einstein's equations will be manifest. We will be considering the interaction between two waves. By restricting our attention to somewhat idealized situations, it will be possible to describe some types of wave interaction in terms of exact solutions..."

Floyd L. WILLIAMS. — **Lectures on the spectrum of  $L^2(\Gamma \backslash G)$** . — Pitman Research Notes in Mathematics series, vol. 242. — Un vol. broché,  $16,5 \times 24,5$ , de 348 p. — Prix: £26.00. — Longman, Harlow, 1991.

This research note provides an introduction to the Selberg trace formula, and for the study of the cohomological and geometric meaning of the multiplicity of certain unitary representations in the spectral decomposition of  $L^2(\Gamma \backslash G)$ , where  $\Gamma$  is a discrete subgroup of a semi-simple Lie group  $G$ . Some of the topics covered are: Dirac operators, spherical functions and class 1 representations, Paley-Wiener theorems for spherical Fourier transforms, Zuckerman's cohomological parabolic induction, computation of orbital integrals, the Selberg trace formula, Eisenstein series, and the Selberg-Gangolli zeta function.

John E. GILBERT, Margaret A.M. MURRAY. — **Clifford algebras and Dirac operators in harmonic analysis**. — Cambridge studies in advanced mathematics, vol. 26. — Un vol. relié,  $15,5 \times 23,5$ , de vi, 334 p. — Prix: £37.50/US\$75.00. — Cambridge University Press, Cambridge, 1991.

The aim of this book is to unite the seemingly disparate topics of Clifford algebras, analysis on manifolds and harmonic analysis. The authors show how algebra, geometry and differential equations all play a more fundamental role in Euclidean Fourier analysis than has been fully realised before. Their presentation of Euclidean theory then links up naturally with the representation theory of semi-simple Lie groups.

**Proceedings of the 5th European Conference on Mathematics in Industry, June 6-9, 1990, Lahti**. — Ed. by Matti Heiliö. — European Consortium for Mathematics in Industry (ECMI), vol. 7. — Un vol. relié,  $16,5 \times 24,5$ , de x, 400 p. — Prix: Dfl. 260.00/US\$ 139.00/£89.00. — Kluwer Academic Publishers, Dordrecht, 1991.

The interaction between modern applications-oriented mathematics and the advancing front of technology is a promising area of knowledge transfer. An ingenious use of the mathematical and computational approach, made more appropriate and effective by the computing power available nowadays, has become an increasingly important tool for various tasks in the research and control of industrial process and systems. These proceedings contain a selection of ideas, methods and case-examples from various fields of industrial mathematics. The application areas include the supply and distribution of energy, fluid and gas dynamics, electromagnetic fields, welding and casting, phase and shape transitions, chemical reactors, measurements and signals, shape optimization, mechanical systems.. etc.

V.I. FABRIKANT. — **Mixed boundary value problems of potential theory and their applications in engineering**. — Mathematics and its applications, vol. 68. — Un vol. relié,

16,5 × 24,5, de x, 451 p. — Prix: Dfl. 270.00/US\$ 134.00/£89.00. — Kluwer Academic Publishers, 1991.

The theory of potential has numerous applications in various branches of engineering science: solid and fluid mechanics, acoustics, heat transfer, electrostatics, wave diffraction, fracture, etc. The analytical solution of mixed boundary value problems requires a knowledge of various integral transforms and/or special functions series expansions and a numerical solution is extremely difficult due to singularities. A new approach, developed by the author, makes it possible to solve various problems in an elementary and straightforward way which does not require the use of integral transforms of special function expansions. This work represents the second part of a two-part project. The first part ("Applications of potential theory in mechanics", Kluwer, 1989) concentrated on results in linear elasticity. This second volume is devoted to new results in electromagnetics, acoustics and diffusion.

**Geometry and complex variables.** — Proceedings of an international meeting on the occasion of the IX Centennial of the University of Bologna. — Ed. by Salvatore Coen. — Lecture notes in pure and applied mathematics, vol. 132. — Un vol. broché, 18 × 25,5, de XIII, 493 p. — Marcel Dekker, New York, 1991.

Building upon the rich tradition of the University of Bologna's great mathematics teachers, this volume contains new studies on the history of mathematics, including the algebraic geometry work of F. Enriques, B. Levi, and B. Segre, complex function theory ideas of L. Fantappiè, B. Levi, S. Pincherle and G. Vitali, series theory and logarithm theory contributions of P. Mengoli and S. Pincherle, etc. Including survey papers on combinatorics, complex analysis, and complex algebraic geometry inspired by Bologna's mathematicians and current advances, this book illustrates the classic works and ideas in the field and their influence on today's research.

V.I. ARNOLD. — **The theory of singularities and its applications.** — Lezioni fermiane. — Un vol. broché, 17 × 24, de 72 p. — Prix: £9.95/US\$ 19.95. — Cambridge University Press, Cambridge, 1991.

De la préface: "... The main lesson of singularity theory is that, while the diversity of general possibilities is enormous, in most cases only some standard phenomena occur. It is possible and useful to study these standard phenomena once for all times and then recognize them as the elements of more complicated phenomena, which are combinations of those standard elements. In these lectures I shall describe some of such elementary singularities and some of the simplest of their applications..."

**Surveys in combinatorics, 1991.** — Edited by A.D. Keedwell. — London Mathematical Society lecture note series, vol. 166. — Un vol. broché, 15 × 23, de 300 p. — Prix: £22.50/US\$ 39.95. — Cambridge University Press, Cambridge, 1991.

This volume contains the invited papers presented at the British Combinatorial Conference, held at the University of Surrey in July 1991 by S.W. Golom, G. Korchmaros, I.G. MacDonald, R. Mathon, J. Nešetřil (with M. Loebel), O. Pretzel, P. Rowlinson, J.A. Bondy, Z. Füredi.

Burkhard KUELSHAMMER. — **Lectures on block theory.** — London Mathematical Society lecture note series, vol. 161. — Un vol. broché, 15 × 23, de VIII, 105 p. — Prix: £10.95/US\$ 22.95. — Cambridge University Press, Cambridge, 1991.

In this volume, the author starts with the classical structure theory of finite dimensional algebras, and leads up to Puig's main result on the structure of the so called nilpotent blocks,

which he discusses in the final chapter. All the proofs in the text are given clearly and in full detail, and suggestions for further readings are also included.

Alessandro FIGA-TALAMANCA, Claudio NEBBIA. — **Harmonic analysis and representation theory for group acting on homogeneous trees.** — London Mathematical Society lecture note series, vol. 162. — Un vol. broché, 15 × 23, de IX, 151 p. — Prix: £15.95/US\$29.95. — Cambridge University Press, Cambridge, 1991.

These notes treat the theory of representations of the group of automorphisms of a homogeneous tree. The unitary irreducible representations are classified in three types: a continuous series of spherical representations; two special representations; and a countable series of cuspidal representations as defined by G.I. Ol'shankii. Several notable subgroups of the full automorphism group are also considered. The theory of spherical functions as eigenvalues of a Laplace (or Hecke) operator on the tree is used to introduce spherical representations and their restrictions to discrete subgroups.

Jerzy KLAMKA. — **Controllability of dynamical systems.** — Mathematics and its applications, East European series, vol. 48. — Un vol. relié, 17 × 24,5, de XVI, 248 p. — Prix: Dfl. 195.00/US\$114.00/£72.00. — Kluwer Academic Publishers, Dordrecht, 1991.

Controllability plays an important role in mathematical control theory, in particular in the study of optimal control and the stabilization of dynamical systems. This book presents a discussion of different kinds of controllability for various types of dynamical systems. Subjects covered include: the application of the Jordan canonical form for investigating controllability; the controllability conditions for linear, stationary and nonstationary dynamical systems with lumped and distributed time-variable delays in control; and the solution of the minimum energy control problem for a wide class of dynamical systems with various types of delay.

Julien C. SPROTT. — **Numerical recipes: routines and examples in BASIC.** — Companion manual to Numerical recipes: the art of scientific computing. — Un vol. broché, 15 × 23, de 398 p. + 1 disquette (instructions). — Prix: £19.50/US\$32.50. — Cambridge University Press, Cambridge, 1991.

The routines and demonstration program from "Numerical recipes: the art of scientific computing" as well as from "Numerical recipes example book" have all been translated (over 350 in all) into BASIC by the author. This book brings the routines and programs together in a single source that includes computer code and code captions from both the book and example book and the commentary from the example book. The author employs Microsoft QuickBasic 4.5, but the recipes are easily adapted for other modern forms of BASIC. The programs contained in this book are also available as machine-readable code on a 5 1/4-inch floppy diskette for IBM compatible computers.

Michelle SCHATZMANN. — **Analyse numérique: cours et exercices pour la licence.** — Un vol. broché, 16 × 23, de 357 p. — InterEditions, Paris, 1991.

Ce livre est issu d'un cours enseigné en licence de mathématiques depuis plusieurs années. Il présente les grandes méthodes d'analyse numérique élémentaire en tenant compte des aspects expérimentaux de cette science et s'adresse aux étudiants de licence ainsi qu'à toute personne désirant aborder l'analyse numérique d'une manière mathématique. L'algèbre linéaire et les méthodes liées à l'orthogonalité forment la base de l'ouvrage.

Verena HUBER-DYSON. — **Gödel's theorems; a workbook on formalization.** — Teubner-  
Texte zur Mathematik, Band 122. — Un vol. broché, 14,5 × 20,5, de 292 p. — Prix: DM 46.00.  
— B.G. Teubner, Stuttgart, 1991.

This is a guide through the conceptual maze that leads to Gödel's famous theorems about the process of formalization, its virtues and its limitations. Keeping in focus the broad scheme of a search for appropriate foundations, attention is paid to intuitionistic reasoning and topos theory. On the other hand, some recent results in combinatorial group theory illustrate the practical significance of the metatheory of undecidability.

Shoichiro SAKAI. — **Operator algebras in dynamical systems.** — Encyclopedia of  
mathematics and its applications, vol. 41. — Un vol. relié, 16 × 24, de xi, 219 p. — Prix:  
£30.00/US\$59.50. — Cambridge University Press, Cambridge, 1991.

This book is concerned with the theory of unbounded derivations in  $C^*$ -algebras, a subject whose study was motivated by questions in quantum physics and statistical mechanics. One of the most ambitious aims of the theory is to develop quantum statistical mechanics within the framework of the  $C^*$ -theory. The presentation, based on lectures given in Newcastle upon Tyne and Copenhagen, concentrates on topics involving quantum statistical mechanics and differentiations on manifolds.

D.J. BENSON. — **Representations and cohomology. Vol. 2: Cohomology of groups and modules.** — Cambridge studies in advanced mathematics, vol. 31. — Un vol. relié, 15,5 × 23,5, de x, 278 p. — Prix: £35.00/US\$59.95. — Cambridge University Press, Cambridge, 1991.

This is the second of two volumes which will provide an introduction to modern developments in the representation theory of finite groups and associative algebras. This volume concentrates on the cohomology of groups, always with representations in view, however. It begins with a background reference chapter, then proceeds to an overview of the algebraic topology and  $K$ -theory associated with the cohomology of groups, especially the work of Quillen. Later chapters look at algebraic and topological proofs of the finite generation of the cohomology ring of a finite group, and an algebraic approach to the Steenrod operations in group cohomology. The book culminates in a chapter dealing with the theory of varieties for modules.

**Advances in finite geometries and designs.** — Proceedings of the Third Isle of Thorns Conference 1990. — Ed. by J.W.P. Hirschfeld, D.R. Hughes, J.A. Thas. — Oxford Science Publications. — Un vol. relié, 16 × 24, de ix, 428 p. — Prix: £40.00. — Oxford University Press, Oxford, 1991.

This book contains articles based on talks at the 3rd Isle of Thorns Conference on Finite Geometries and Designs, which took place from 15 to 21 July, 1990 at a conference centre run by the University of Sussex. There are 34 articles in all. All the papers in this collection either consider particular substructures of Galois geometries or related incidence structures. The latter structures usually have important examples embedded in some sense in a finite projective space. Some of the substructures considered are, in a Galois geometry,  $k$ -arcs, (hyper)ovals, cubic curves,  $(k, t)$ -arcs, nuclei, flocks. A continual theme, either more or less prominent, in both types of structures is the action of an automorphism group.

S.G. VLADUT. — **Kronecker's Jugendtraum and modular functions.** — Studies in the development of modern mathematics, vol. 2. — Un vol. relié, 16 × 23,5, de x, 411 p. — Prix: £46.00/US\$90.00. — Gordon and Breach, New York, 1991.

The arithmetical theory of modular functions is a result of the synthesis of numerous ideas of many outstanding mathematicians. It has taken many decades for this theory to reach its modern state. At present it enjoys a period of flourishing and intense development. The principal intention of this book is to follow the development of one of the main sources of this theory, namely, complex multiplication of elliptic functions, and to describe the present state of the theory.

V.S. BORKAR. — **Topics in controlled Markov chains.** — Pitman research notes in mathematics series, vol. 240. — Un vol. broché,  $17 \times 24,5$ , de 179 p. — Prix: £21.00. — Longman, Harlow, 1991.

This work treats many classical and some nonclassical problems in controlled Markov chains, based on occupation measures and convex analysis. Some highlights are: rederivation of many classical results; a very general (pathwise) treatment of the ergodic control problem; an extensive study of the asymptotic behaviour of the self-tuning adaptive controller and its variant, the Kumar-Becker-Lin scheme; a novel treatment of some multiobjective control problems, inaccessible to traditional methods.

Peter HESS. — **Periodic-parabolic boundary value problems and positivity.** — Pitman research notes in mathematics series, vol. 247. — Un vol. broché,  $17 \times 24,5$ , de 139 p. — Prix: £17.00. — Longman, Harlow, 1991.

“In these notes we give a unified treatment of semilinear nonautonomous diffusion equations and systems thereof, which satisfy a comparison principle, and whose coefficient functions depend periodically on time. Such equations arise naturally, e.g. in biomathematics if one admits dependence of the data on daily, monthly or seasonal variations. Typical examples considered are the logistic equation with diffusion, Fisher’s equation of population genetics, and Volterra-Lotka systems (with diffusion) of competition and of the predator-prey type....”

X. MAO. — **Stability of stochastic differential equations with respect to semimartingales.** — Pitman research notes in mathematics series, vol. 251. — Un vol. broché,  $17 \times 24,5$ , de 276 p. — Prix: £22.00. — Longman, Harlow, 1991.

Numerous problems in science, engineering, economy, and biology lead to the study of stochastic differential equations with respect to semimartingales and to the stability of such equations, rather than to the classical Itô equations. The aim of this Research note is to systematize the author’s own research on the stability of differential equations with respect to semimartingales.

**Fixed point theory and applications.** — Editors: M.A. Théra and J.-B. Baillon. — Pitman research notes in mathematics series, vol. 252. — Un vol. broché,  $17 \times 24,5$ , de 465 p. — Prix: £30.00. — Longman, Harlow, 1991.

This volume comprises the proceedings of an international conference held at CIRM (Centre de rencontres mathématiques), Marseille-Luminy, France, June 5-9, 1989. The papers are representative of current research into fixed points of multivalued mappings; topological methods; applications to economics, differential equations, game theory and optimization.

N.U. AHMED. — **Semigroup theory with applications to systems and control.** — Pitman research notes in mathematics series, vol. 246. — Un vol. broché,  $17 \times 24,5$ , de 282 p. — Prix: £22.99. — Longman, Harlow, 1991.

Abstract theory of control systems is developing at a rapid pace, and this theory is heavily dependent on knowledge of semigroup theory. Thus, both experts and students of control theory who are not familiar with semigroup theory are unable to read the current literature on the subject and are therefore restricted from a powerful body of knowledge in control and systems. This Research note contains and develops most of the necessary materials on semigroup theory with proofs, and then demonstrates their application in systems and control theory.

G. KARPILOVSKY. — **The Jacobson radical of classical rings.** — Pitman monographs and surveys in pure and applied mathematics, vol. 53. — Un vol. relié, 16 × 24, de xvi, 563 p. — Prix: £48.00. — Longman, Harlow, 1991.

The purpose of this monograph is to provide a comprehensive coverage of the structure of the Jacobson radical of classical rings. During the last two decades, the subject has been pursued by a number of researchers and many interesting results have been obtained. The present book ties together various threads of the development and conveys a comprehensive picture of the current state of the subject. Special attention is drawn to the latest discoveries concerning the Jacobson radical of graded rings.

**Differential geometry : a symposium in honour of Manfredo do Carmo.** — Editors: Blaine Lawson and K. Tenenblat. — Pitman monographs and surveys in pure and applied mathematics, vol. 52. — Un vol. relié, 16 × 24, de 375 p. — Prix: £42.00. — Longman, Harlow, 1991.

The papers contained in this volume cover a broad spectrum of topics: the families index theorem for manifolds with boundary, harmonic mappings and group representations, eigenvalues of the Laplacian on locally symmetric spaces, metrics of constant scalar curvature in a given conformal class, the isoperimetric problem, intrinsic geometric generalizations of the wave and sine-Gordon equations, Chow varieties and group actions on algebraic spaces, the “chopping” of Riemannian manifolds with applications to the theory of characteristic numbers of open manifolds, and the geometric theory of subharmonic functions. There are many papers concerned with submanifold theory and, in particular, the theory of minimal varieties.

Olga LADYZHENSKAYA. — **Attractors for semigroups and evolution equations.** — Lezione Lincei. — Un vol. broché, 13,5 × 21,5, de xi, 73 p. — Prix: £7.95/US\$ 16.95 (broché), £22.95/US\$ 39.95 (relié). — Cambridge University Press, Cambridge, 1991.

This book presents an expansion of the lectures given at the University of Rome, “La Sapienza”. The lectures were devoted to questions of the behaviour of trajectories for semigroups of nonlinear bounded continuous operators in a locally non-compact metric space and for solutions of abstract evolution equations. The latter contain many boundary value problems for partial differential equations of a dissipative type.

J. DENES and A.D. KEEDWELL. — **Latin squares : new developments in the theory and applications.** — Annals of discrete mathematics, vol. 46. — Un vol. relié, 17 × 24,5, de xiv, 453 p. — Prix: US\$ 128.50/Dfl. 225.00. — North-Holland, Amsterdam, 1991.

In 1974 the editors of the present volume published a book entitled “Latin squares and their applications”. It included a list of 73 unsolved problems of which about 20 have been completely solved in the intervening period and about 10 more have been partially solved. The present work comprises 6 contributed chapters and also 6 further chapters written by the editors

themselves. As well as discussing the advances made in the field, it contains one chapter which deals with a subject ( $r$ -orthogonal Latin squares) which did not exist when the earlier book was written.

David RUELLE. — **Hasard et chaos.** — Un vol. broché,  $15,5 \times 24$ , de 247 p. — Prix: FF 140.00. — Editions Odile Jacob, Paris, 1991.

Comment expliquer le hasard? Peut-on rendre raison de l'irraisonnable? C'est à démêler l'écheveau de l'imprévisible et du désordre que s'attache David Ruelle, car si le hasard a ses raisons, il a aussi une raison. Cette quête conduira le lecteur à se pencher sur les jeux de dés, les loteries, les billards, les attracteurs étranges, l'astrologie et les oracles, le temps qu'il fera, le libre-arbitre, la mécanique quantique, l'écoulement des fluides, le théorème de Gödel et les limites de l'entendement humain.

Franco BREZZI, Michel FORTIN. — **Mixed and hybrid finite element methods.** — Springer series in computational mathematics, vol. 15. — Un vol. relié,  $16 \times 24$ , de ix, 350 p. — Prix: DM 108.00. — Springer-Verlag, Berlin, 1991.

Research on non-standard finite element methods is evolving rapidly and in this text Brezzi and Fortin give a general framework in which the development is taking place. The presentation is built around a few classic examples: Dirichlet's problem, Stokes problem, Linear elasticity. The authors provide with this publication an analysis of the methods in order to understand their properties as thoroughly as possible.

A. ISERLES and S.P. NORSETT. — **Order stars.** — Applied mathematics and mathematical computation, vol. 2. — Un vol. relié,  $14 \times 22,5$ , de xi, 248 p. — Prix: £25.00. — Chapman & Hall, London, 1991.

Order stars is a recently developed technique to analyse and explain the behaviour of numerical methods. The main idea is to explore different features of numerical algorithms as properties of analytic functions in various portions of the complex plane. Thus, for example, the order of some numerical methods for ordinary differential equations can be "translated" to the language of approximation theory. Likewise, stability properties of the underlying method can be expressed as some other features of the function  $R$ . (P.S.: Several proofs, especially in Chapter 5, are not correct. Figure 5.4 is wrong too, due to a sign error in Example 5.3. The 4-th order ADAMS method is a counterexample to "Open Problem 8".)

**Algebra II: noncommutative rings, identities.** — Ed. by A.I. Kostrikin, I.R. Shafarevich. — Encyclopaedia of mathematical sciences, vol. 18. — Un vol. relié,  $16 \times 24$ , de vii, 234 p. — Prix: DM 128.00. — Springer-Verlag, Berlin, 1991.

Algebra II is a two-part survey on the subject of non-commutative rings and algebras, with the second part focused on the theory of identities of these and other algebraic systems. It provides a broad overview of the most modern trends encountered in non-commutative algebra, as well as the numerous connections between algebraic theories and other areas of mathematics. Throughout the book, the authors include the historical background of the trends they are discussing.

P.J. CAMERON and J.H. VAN LINT. — **Designs, graphs, codes and their links.** — London Mathematical Society student texts, vol. 22. — Un vol. broché,  $15 \times 23$ , de viii, 240 p. — Prix: £12.95/US\$24.95, (relié: £35.00/\$54.95). — Cambridge University Press, Cambridge, 1991.

Although design theory, graph theory and coding theory, had their origins in various areas of applied mathematics, today they are found under the umbrella of discrete mathematics. Here the authors have considerably reworked and expanded their earlier successful books on designs, graphs and codes, into an invaluable textbook. They do not seek to consider each of these three topics individually, but rather to stress the many and varied connections between them. The discrete mathematics needed is developed in the text, making this book accessible to any student with a background of undergraduate algebra.

R. KIRCHER, W. BERGNER. — **Three-dimensional simulation of semiconductor devices.** — Progress in numerical simulation for microelectronics, vol. 1. — Un vol. relié,  $15,5 \times 23$ , de 124 p. — Prix: SFr. 82.00. — Birkhäuser Verlag, Basel, 1991.

Insight is given here into modeling complex device structures in three dimensions. Starting from the basic differential equations and the physical models describing the transport in semiconductors, the work shows how to obtain the discretized equations, and discusses important numerical methods for solving these equations. How three-dimensional simulations can be utilized to analyze complex device structures and to optimize their electrical characteristics is illustrated by two specific examples. This book originated from the practical experience collected during the development of a three-dimensional device simulator for industrial use.

Gove W. EFFINGER, David R. HAYES. — **Additive number theory of polynomials over a finite field.** — Oxford mathematical monographs. — Un vol. relié,  $16 \times 24$ , de xvi, 157 p. — Prix: £22.50. — Clarendon Press, Oxford, 1991.

This volume is a systematic treatment of the additive number theory of polynomials over a finite field. In providing asymptotic proofs of both the Polynomial Three Primes Problem (an analog of Vinogradov's theorem) and the Polynomial Waring Problem, the book develops the various tools necessary to apply an adelic "circle method" to a wide variety of additive problems in both the polynomial and classical settings. A key to the methods employed here is that the generalised Riemann Hypothesis is valid in this polynomial setting.

Leonard EVENS. — **The cohomology of groups.** — Oxford mathematical monographs. — Un vol. relié,  $16 \times 24$ , de xii, 159 p. — Prix: £20.00. — Clarendon Press, Oxford, 1991.

This book presents an account of the theory of the cohomology ring of a finite group. The aim is to present a modern approach from the point of view of homological algebra, and the volume covers themes such as finite generation theorems, the cohomology of wreath products, the norm map, and variety theory. The book will be useful for those already engaged or commencing in research in this area of mathematics by providing an up-to-date survey of important techniques and their applications to finite group theory.

Stewart SHAPIRO. — **Foundations without foundationalism : a case for second-order logic.** — Oxford logic guides, vol. 17. — Un vol. relié,  $16 \times 24$ , de xx, 277 p. — Prix: £35.00. — Clarendon Press, Oxford, 1991.

The central contention of this book is that second-order logic has a central role to play in laying the foundations of mathematics. In order to develop the argument fully, the author presents a detailed development of higher-order logic, including a comprehensive discussion of its semantics. The author demonstrates the prevalence of second-order notions in mathematics, and also the extent to which mathematical concepts can be formulated in second-order languages. Throughout, the emphasis is on discussing the philosophical and historical issues associated with this subject, and the implications that they have for foundational studies.



**Effective methods in algebraic geometry.** — Edited by Teo Mora, Carlo Traverso. — Progress in mathematics, vol. 94. — Un vol. relié, 16 × 24, de xiv, 500 p. — Prix: SFr. 98.00. — Birkhäuser, Boston, 1991.

The present volume contains a selection of refereed papers from a symposium, held in Castiglioncello (Livorno, Italy), April 17-21, 1990 and entitled “MEGA-90 — Effective Methods in Algebraic Geometry”. These papers are centered on the themes of: effective methods and complexity issues in commutative algebra, projective geometry, real geometry, algebraic number theory, and algebraic geometric methods in algebraic computing.

Claude GODBILLON. — **Feuilletages : études géométriques.** — Progress in mathematics, vol. 98. — Un vol. relié, 16 × 24, de xiii, 474 p. — Prix: SFr. 168.00. — Birkhäuser, Boston, 1991.

Covering the entire range from the introduction of foliations to recent results on this topic, “Feuilletages” stands out for its completeness and methodology. This textbook provides an excellent tool for courses in geometry and topology. An extensive bibliography adds to its value. This work forms a vital part of the author’s mathematical legacy and testifies to his versatility and ingenuity.

B. MALGRANGE. — **Equations différentielles à coefficients polynomiaux.** — Progress in mathematics, vol. 96. — Un vol. relié, 16 × 24, de 232 p. — Prix: SFr. 86.00. — Birkhäuser, Boston, 1991.

The first part of this new, original research monograph gives a geometric description of holonomic differential systems in one variable. The basic ingredient is the description of meromorphic connections with irregular singularities by Stokes structures. The second part analyzes how these data are changed by the action of the Fourier-Laplace transform in the case of systems with polynomial coefficients. Thus the author demonstrates how, on one side, the subject is related to the modern algebraic theory of differential systems; on the other side, it is related to classical analysis and mathematical physics, especially with the Laplace method in the theory of differential equations with polynomial coefficients.

David MUMFORD, Madhav NORI, Peter NORMAN. — **Tata lectures on theta III.** — Progress in mathematics, vol. 97. — Un vol. relié, 16 × 24, de vii, 202 p. — Prix: SFr. 78.00. — Birkhäuser, Boston, 1991.

This volume is the third of a three volume series surveying the theory of theta functions which play a central role in the fields of complex analysis, algebraic geometry, number theory and most recently particle physics. These volumes constitute a systematic exposition of theta functions, beginning with their historical roots as analytic functions in one variable (vol. 1), touching on some of the beautiful way they can be used to describe moduli spaces (vol. 2), and culminating in a methodical comparison of theta functions in analysis, algebraic geometry, and representation theory (vol. 3).

**Modeling, estimation and control of systems with uncertainty.** — Proceedings of a conference held in Sopron, Hungary, September 1990. — Edited by B. Di Masi, A. Gombani, A.B. Kurzhansky. — Progress in systems and control theory, vol. 10. — Un vol. relié, 16 × 24, de vii, 467 p. — Prix: SFr. 148.00. — Birkhäuser, Boston, 1991.

In most actual applications of modeling and control of systems, uncertainty due to measurement error or poor understanding of the underlying mechanisms is a major stumbling block to

solution of the problems. For this reason, models that take into account these intrinsic uncertainties have been used by a wide variety of research workers, and techniques for the analysis of their behavior as well as for their estimation and control have been developed. The most effective methods for dealing with uncertainty consist of description by stochastic processes or in terms of set-valued dynamics. This volume collects and interleaves relevant contributions in both directions.

**New trends in systems theory.** — Proceedings of the Università di Genova-The Ohio State University Joint Conference, July 9-11, 1990. — Edited by G. Conte, A.M. Perdon, B. Wyman. — Progress in systems and control theory, vol. 7. — Un vol. relié, 16 × 24, de xvii, 722 p. — Prix: SFr. 198.00. — Birkhäuser, Boston, 1991.

This volume makes available to a wider audience the written, refereed and revised papers reflecting the lectures given and discussed at the 1991 Genova Conference on New Trends in Systems Theory. Particular emphasis was put on mathematical methods in the theory of linear and nonlinear systems, stability and stabilizability, robust control, adaptive control, and robotics.

**Perspectives on the history of mathematical logic.** — Edited by Thomas Drucker. — Un vol. relié, 16 × 24, de xxiii, 195 p. — Prix: SFr. 108.00. — Birkhäuser, Boston, 1991.

This volume offers insights into the development of mathematical logic over the last century. Arising from a special session on the history of logic at an American Mathematical Society meeting, the chapters explore technical innovations, the philosophical consequences of work during the period, and the historical and social context in which the logicians worked. The discussions herein will appeal to mathematical logicians, historians of mathematics, as well as philosophers and historians of science.

**Fractal geometry and analysis.** — Proceedings of the NATO Advanced Study Institute and Séminaire de mathématiques supérieures, Montréal, July 3-21, 1989. — Edited by Jacques Bélair and Serge Dubuc. — NATO ASI series, series C: vol. 346. — Un vol. relié, 17 × 24,5, de xv, 472 p. — Prix: Dfl. 240.00/US\$ 129.00/£ 82.00. — Kluwer Academic Publishers, Dordrecht, 1991.

From the preface: The volume is the fruit of the work of the Advanced Study Institute devoted to fractal geometry and analysis. Different foundational contributions for fractal geometry like measure theory, dynamical systems, iteration theory, branching processes are recognized. The geometry of fractal sets and the analytical tools used to investigate them provide a unifying theme of this book.

Daniel BAETTIG, Horst KNOERRER. — **Singularitäten.** — Lectures in mathematics, ETH Zürich. — Un vol. broché, 17 × 24, de 140 p. — Prix: SFr. 34.00. — Birkhäuser, Basel, 1991.

Fragen über Singularitäten analytischer Räume und Abbildungen treten in vielen verschiedenen Zusammenhängen, insbesondere der Geometrie und der Analysis auf. Dieser Text ist eine Einführung in die Methoden, derartige Probleme zu betrachten. Ausgehend von dem Beispiel einfacher Singularitäten werden Techniken wie Auflösung von Singularitäten, Monodromieuntersuchungen und der Gauss-Manin-Zusammenhang behandelt. Das Buch wendet sich an Studenten und Mathematiker, die einen ersten Eindruck vom Gebiet der Singularitäten bekommen möchten.

Derek W. ROBINSON. — **Elliptic operators and Lie groups.** — Oxford mathematical monographs. — Un vol. relié, 16 × 24, de XI, 558 p. — Prix: £45.00. — Clarendon Press, Oxford, 1991.

Elliptic operators arise naturally in several different mathematical settings, notably in the representation theory of Lie groups, the study of evolution equations, and the examination of Riemannian manifolds. This book develops the basic theory of elliptic operators on Lie groups and thereby extends the conventional theory of parabolic evolution equations to a natural non-commutative context. In order to achieve this goal, the author presents a synthesis of ideas from partial differential equations, harmonic analysis, functional analysis, and the theory of Lie groups.

Heinz-Jürgen VOSS. — **Cycles and bridges in graphs.** — Mathematics and its applications, East European series, vol 49. — Un vol. relié, 16,5 × 24,5, de XII, 271 p. — Prix: Dfl. 190.00/US\$ 112.00/£67.00. — Kluwer Academic Publishers, Dordrecht, 1991.

This volume is devoted to cycles and bridges in graphs. Particular attention is given to bridges of cycles in finite undirected simple graphs. This book covers various topics including overlap graphs (bridge graphs), separating and nonseparating cycles, the length and the circumference of bridges, isomorphic bridges in 2-connected graphs, and cycles with prescribed bridges. A larger part of the book is devoted to bounds on the length of cycles and the number of diagonals of cycles of graphs depending on the degrees of the vertices and the girth of the graphs.

Paulo RIBENBOIM. — **The little book of big primes.** — Un vol. broché, 15,5 × 23,5, de XVII, 237 p. — Prix: DM 49.50. — Springer-Verlag, New York, 1991.

The book is devoted to presenting records concerning prime numbers, but it also explores the interface between computations and the theory of prime numbers. The book contains an up-to-date historical presentation of the main problems pertaining to prime numbers, as well as many fascinating topics, including primality testing. It is written in a light and humorous language without secrets and it is thoroughly accessible to everyone. This abridged version is specially designed to avoid technical material and to be understood by all people interested in numbers.

Peter GRINDROD. — **Patterns and waves: the theory and applications of reaction-diffusion equations.** — Oxford applied mathematics and computing science series. — Un vol. broché, 15,5 × 23,5, de VIII, 239 p. — Prix: £17.50. — Clarendon Press, Oxford, 1991.

This textbook is concerned with the study of certain classes of nonlinear partial differential equations known collectively as reaction-diffusion equations. The author's aim is to present an introduction to the theory of these equations, to provide a compendium of useful techniques for their analysis, and to show how these find application in a variety of settings notably in pattern formation and nonplanar wave-like structures.