

**Zeitschrift:** L'Enseignement Mathématique  
**Band:** 49 (2003)  
**Heft:** 1-2: L'ENSEIGNEMENT MATHÉMATIQUE  
  
**Rubrik:** BULLETIN BIBLIOGRAPHIQUE

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## BULLETIN BIBLIOGRAPHIQUE

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### *Généralités*

Élie AZOULAY, Jean AVIGNANT, Guy AULIAC. — **Problèmes corrigés de mathématiques: épreuves du DEUG MIAS/SM, 1<sup>ère</sup> année.** — 2<sup>e</sup> édition. — Un vol. broché, 15×23, de VII, 215 p. — ISBN 2-10-006677-3. — Prix: € 18.00. — Ediscience, Paris, 2002.

Après que l'étudiant ait fait usage des livres de cours et résolu un certain nombre d'exercices permettant de contrôler ses acquisitions, il ressent le besoin de préparer plus spécialement l'examen grâce à des épreuves réelles. C'est à cette fin que répondent les présents volumes dans lesquels nous avons rassemblé des épreuves pour la plupart proposées soit à un examen partiel, soit à un examen final du DEUG Sciences provenant de diverses universités; le tome 1 est essentiellement destiné aux étudiants de 1<sup>ère</sup> année, le tome 2 à ceux de 2<sup>e</sup> année. Les épreuves présentées ici se répartissent en deux types. Les unes consistent en une suite d'exercices portant sur des thèmes très différents. D'autres, plus traditionnelles et plus structurées, portent sur un ou plusieurs thèmes majeurs. L'ensemble reflète donc la diversité des sujets auxquels peuvent être confrontés les étudiants.

Elwyn R. BERLEKAMP, John H. CONWAY, Richard K. GUY. — **Winning ways for your mathematical plays, vol. 2.** — Second edition. — Un vol. broché, 18,5×23,5, de XVII, p. 277-473. — ISBN 1-568881-142-X. — Prix: US\$ 39.00. — A. K. Peters, Natick, Massachusetts, 2003.

In the quarter of a century since three mathematicians and game theorists collaborated to create *Winning Ways for your Mathematical Plays*, the book has become the definitive work on the subject of mathematical games. Now carefully broken down into four volumes to accommodate new developments, the second edition retains the original's wealth of wit and wisdom, but in a more easily accessible format. The authors' insightful strategies, blended with their witty and irreverent styles, make reading a profitable pleasure. In Volume 2, the authors have a Change of Heart and bend the rules of Volume 1 to apply them to games that may continue indefinitely or in which "winning" is not necessarily making the last move, such as Cut-cake and Loopy Hackenbush. This essential companion to Volume 1 explores "partisan" games of infinitely many positions and "loopy" unending and impartial games with the same playful tone and rigorous mathematical analysis perfected in the first volume of this classic work.

Hassan BOUALEM, Robert BROUZET. — **La planète R: voyage au pays des nombres réels: avec exercices corrigés.** — Un vol. broché, 17×24, de VIII, 248 p. — ISBN 2-10-005940-8. — Prix: € 22.50. — Dunod, Paris, 2002.

Dans l'univers des mathématiques, les réels, êtres aux propriétés mystérieuses, ont leur planète... Découvrez-la et percez ses secrets grâce à cet ouvrage original, conçu comme un

recueil de courtes leçons, classées en trois parties: Les aspects arithmétiques (irrationalité, transcendance...), les constructions et représentations des réels, les sous-ensembles remarquables (mesurables, parfaits, maigre, ensemble de Cantor...). Les leçons sont abondamment pourvues d'exercices corrigés et complétées par des annexes comprenant notamment du vocabulaire de base en théorie des ensembles et en algèbre en général, ainsi que de rudiments de topologie.

Paul DOUKHAN, Jean-Claude SIFRE. — **Cours d'analyse, tome 2: calcul différentiel, intégration et probabilités.** — Agrégation de mathématiques. — Un vol. broché, 17,5×25, de XVIII, 486 p. — ISBN 2-10-005318-3. — Prix: €42.00. — Dunod, Paris, 2002.

Ce cours d'analyse vise la préparation à l'épreuve écrite d'analyse et probabilités de l'Agrégation de mathématiques. Ce second volume est orienté vers l'étude des fonctions de plusieurs variables réelles et les probabilités. Le calcul différentiel et ses grands théorèmes sont présentés dans un souci de vision géométrique et d'effectivité dans les preuves. Ils servent de base à une étude qualitative moderne des équations différentielles (linéaires et non linéaires) et la stabilité de leurs solutions, ainsi qu'aux fonctions analytiques, et à une approche de la géométrie différentielle (sous-variétés de  $\mathbf{R}^d$ ). Les conséquences de la variation bornée des fonctions et des mesures complètent l'intégration vue dans le premier volume. L'ouvrage s'achève par des chapitres plus appliqués sur les transformations intégrales, les ondelettes et une introduction aux probabilités.

Anthony JOSEPH, Anna MELKINOV, Rudolf RENTSCHLER, (Editors). — **Studies in memory of Issai Schur.** — Progress in mathematics, vol. 200. — Un vol. relié, 16×24, de CLXXXIII, 365 p. — ISBN 0-8176-4208-0. — Prix: SFr. 186.00. — Birkhäuser, Boston, 2003.

This volume is dedicated to the memory of Issai Schur. It opens with some biographical reminiscences of the famous school he established in Berlin, his brutal dismissal by the Nazi regime and his tragic end in Palestine. This is followed by an extensive review of the extraordinary impact of his lesser known analytic work. Finally, leading mathematicians working in the representation theory of the symmetric groups, of semisimple and affine Lie algebras and of Chevalley groups have contributed original and outstanding articles. These concern many areas inspired by Schur's work as well as more recent developments involving crystal and canonical bases, Hecke algebras, and the geometric approach linking orbits to representations.

Carolyn KIERAN, Ellice FORMAN, Anna SFARD, (Editors). — **Learning discourse: discursive approaches to research in mathematics education.** — Un vol. relié, 16,5×24,5, de 298 p. — ISBN 1-4020-1024-9. — Prix: €109.00. — Kluwer, Dordrecht, 2002.

The authors of this volume claim that mathematics can be usefully reconceptualized as a special form of communication. As a result, the familiar discussion of mental schemes, misconceptions, and cognitive conflict is transformed into a consideration of activity, patterns of interaction, and communication failure. By equating thinking with communicating, the discursive approach also deconstructs the problematic dichotomy between "individual" and "social" research perspectives. Although each author applies his or her own analyses to the discourse generated by students and teachers grappling with mathematical problems, their joint aim is to put discursive research into the limelight and to spur thinking about its nature and its possible advantages and pitfalls. This volume is therefore addressed both to those interested in specific questions regarding classroom communication, and to those who are looking for a general conceptual lens with which to tackle the complexity of mathematical teaching and learning.

Gilah C. LEDER, Erkki PEHKONEN, Günter TÖRNER, (Editors). — **Beliefs: a hidden variable in mathematics education?** — Mathematics Education Library. — Un vol. relié, 16,5 × 24,5, de XIX, 362 p. — ISBN 1-4020-1057-5. — Prix: € 138.00. — Kluwer, Dordrecht, 2002.

The book is divided into three, partly overlapping, sections. The first concentrates on conceptualisation and measurement of beliefs, the second on research about teachers' beliefs, and the third on facets of students' beliefs about mathematics. A diversity of instruments is used for data collection, including surveys, interviews, observations, and essay writing as well as more innovative approaches. The volume is intended for researchers in the field, as well as for mathematics educators teaching the next generation of students. The book is also useful for those working in other subject disciplines, since many of the themes explored have relevance well beyond mathematics education.

Jonathan LEWIN. — **An interactive introduction to mathematical analysis.** — Un vol. broché, 17,5 × 25, de XXXII, 492 p. — ISBN 0-521-01718-1. — Prix: £ 27.95. — Cambridge University Press, Cambridge, 2003.

This book provides a rigorous course in the calculus of functions of a real variable. The gentle approach, particularly in the early chapters, makes it especially suitable for students who are not headed for graduate school, but, for those who are, this book also provides the opportunity to engage in a penetrating study of real analysis. The CD bundles with the book contains an on-screen version with hundreds of links to alternative approaches, more complete explanations, and solutions to exercises – links that make it more friendly than any printed book could be. The on-screen version also provides exercises that can be worked interactively with the help of the computer algebra systems that are bundled with *Scientific Notebook*. The CD bundled with the book contains also a time-limited copy of *Scientific Notebook* and a copy of *Scientific Viewer* which are registered trademarks of MacKichan Software, Inc.

Alexander V. MIKHALEV, Günter F. PILZ. — **The concise handbook of algebra.** — Un vol. relié, 16 × 24, de XVI, 179 p. — ISBN 0-7923-7072-4. — Prix: € 126.00. — Kluwer, Dordrecht, 2002.

*The Concise Handbook of Algebra* provides a succinct, but thorough treatment of algebra. The editors have gone to great lengths to capture the core essence of the different ideas, concepts and results that make up algebra as we know it today. In a collection that spans about 150 sections organized in 9 chapters, algebraists are provided with a standard knowledge set for their areas of expertise. Other readers meanwhile, are equipped with a quick and dependable reference to the area as a whole. All of this is presented uniformly with cross-references linking the sections. The target audience consists of anyone interested in algebra, from graduate students to established researchers, including those who want to obtain a quick overview or a better understanding of the selected topics. — *Contents*: Semigroups. — Groups. — Rings, modules, algebras. — Fields. — Representation Theory. — Lattices. — Universal algebra. — Homological algebra. — Miscellaneous.

Annelies PAULITSCH. — **Spiele, Spiele, Spiele: den Zahlen abgeguckt und für den Mathematikunterricht aufbereitet.** — Kopiervorlagen Mathematik. — Un vol. broché-spirale, 22 × 30, de 112 p. — ISBN 3-7614-2442-6. — Prix: € 19.50. — Aulis Verlag Deubner, Köln, 2002.

Eine häufige Erfahrung, die Lehrkräfte machen: Spiele sind nun mal beliebter als Übungen! Dieser Erkenntnis kommt dieser Band entgegen, denn er hält 22 Spiele für die Klassen 5 und 6 bereit. Er umfasst Kopiervorlagen mit vielfältigen, grafisch anregend gestalteten Aufgabstellungen sowie dazugehörige Lösungsblätter. Die beiden Hauptkapitel umfassen Spiele mit natürlichen Zahlen, Mengen und Relationen sowie Spiele mit Brüchen, Dezimalzahlen und ganzen Zahlen.

Burkard POLSTER. — **The mathematics of juggling.** — Un vol. broché,  $15,5 \times 23,5$ , de xvii, 226 p. — ISBN 0-387-95513-5. — Prix: € 39.95. — Springer, New York, 2003.

Learn to juggle numbers! This book is the first comprehensive account of the mathematical techniques and results used in the modelling of juggling patterns. This includes all known and many new results about juggling sequences and matrices, the mathematical skeletons of juggling patterns. Many useful and entertaining tips and tricks spice up the mathematical menu presented in this book. There are detailed descriptions of jugglable and attractive juggling sequences, easy zero-gravity juggling, robot juggling, as well as fun juggling of words, antiballs, and irrational numbers. The book also includes novel, or at least not very well-known, connections with topics such as bell ringing, knot theory, and the many-body problem. In fact, the chapter on mathematical bell ringing has been expanded into the most comprehensive survey in the literature of the mathematics used by bell ringers.

Derek J.S. ROBINSON. — **An introduction to abstract algebra.** — De Gruyter textbook. — Un vol. broché,  $17 \times 24$ , de x, 282 p. — ISBN 3-11-017544-4. — Prix: € 40.14. — Walter de Gruyter, Berlin, 2003.

Introducing the main concepts of modern algebra, the book contains numerous applications, which are intended to illustrate the concepts and to convince the reader of the utility and relevance of algebra today. In particular applications to Pólya coloring theory, latin squares, Steiner systems and error correcting codes are described. Another feature of the book is that group theory and ring theory are carried further than is often done at this level. There is ample material here for a two semester course in abstract algebra. The importance of proof is stressed and rigorous proofs of almost all results are given. But care has been taken to lead the reader through proofs by gentle stages. There are nearly 400 problems, of varying degrees of difficulty, to test the reader's skill and progress.

Hans J. SCHMIDT, Kathrein SCHADOW. — **Prof. Dr. R. E. Member's Mathe-memo.** — Kopiervorlagen Mathematik. — Un vol. broché-spirale,  $22 \times 30$ , de 96 p. — ISBN 3-7614-2437-X. — Prix: € 17.50. — Aulis-Verlag Deubner, Köln, 2002.

Der Autor H. J. Schmidt hat das Prinzip des Memory auf die Freiarbeit im Mathematikunterricht der S I angewandt. Einstanden sind dabei 11 Memo-Spiele mit jeweils 72 Karten (36 „Pärche“). Wie im Memory gewohnt, versucht man entsprechende „Pärchen“ aufzudecken. Beim Mathe-Memo sind diese Karten durch mathematische Beziehungen verbunden, die es zu durchschauen oder zu errechnen gilt. Die Themen umfassen: Grundwissen Bruchrechnen – Grundwissen Geometrie – Römische Zahlzeichen – Zehnersystem – Quadratzahlen – Zweiersystem – Dezimalbrüche – Koordinatensystem. – Lineare Funktionen – Quadratische Funktionen Satz des Vieta. — Fazit: Die Spielform „Memo“ ermöglicht methodische Abwechslung, und die Schüler können nach festgelegten Regeln eigenverantwortlich arbeiten.

Gilbert A. VALVERDE, Leonard J. BIANCHI, Richard G. WOLFE, William H. SCHMIDT, Richard T. HOUANG. — **According to the Book: using TIMSS to investigate the translation of policy into practice through the world of textbooks.** — Un vol. relié,  $16 \times 25$ , de ix, 199 p. — ISBN 1-4020-1033-8. — Prix: € 85.00. — Kluwer, Dordrecht, 2002.

How are curriculum policies translated into opportunities to learn in the classroom? *According to the Book* presents findings from the largest cross-national study of textbooks carried out to date – the curriculum analysis of the 1995 Third International Mathematics and Science Study (TIMSS). This study included a detailed, page-by-page, inventory of the mathematics and science content, pedagogy, and other characteristics collected from hundreds of textbooks in over forty countries. Drawing on these data, the authors investigate the rhetorical

and pedagogical features of textbooks to understand how they promote and constrain educational opportunities. They investigate how textbooks are constructed and how they structure diverse elements into prescriptions for teaching practice. Conclusions are offered regarding the role of textbooks in curriculum-driven educational reform.

## *Histoire*

Tom M. APOSTOL, Jean-Pierre BOURGUIGNON, Michele EMMER, Hans-Christian HEGE, Konrad POLTHIER, (Editors). — **Early history of mathematics.** — Springer VideoMATH. — 1 cassette vidéo VHS/PAL. — ISBN 3-540-92647-X. — Prix: € 39.95. — Springer, Berlin, 2003.

This 30 minute video uses motion, colour, music, and images of original documents to outline some of the important developments in the early history of mathematics, from Babylonian calendars on clay tablets produced 5000 years ago, to landmark events leading to the development of calculus in the seventeenth century. It contains computer-animated demonstrations of the Pythagorean Theorem, the irrationality of the square root of two (a new geometric proof), the formula for the area of a circular disk, and the method of Archimedes for estimating the number pi.

Ioan JAMES. — **Remarkable mathematicians: from Euler to von Neumann.** — Un vol. broché, 15,5 × 23, de XIV, 433 p. — ISBN 0-521-52094-0 (relié: 0-521-81777-3). — Prix: £ 19.95 (relié: £ 50.00). — The Mathematical Association of America, distributed by Cambridge University Press, Cambridge, 2003.

Ioan James introduces and profiles sixty mathematicians from an era which saw mathematics freed from its classical origins to develop into its modern form. The characters, all born between 1700 and 1910, come from a wide range of countries, and all made an important contribution to mathematics, through their ideas, their teaching, their influence, and so on. The book is organised chronologically into ten chapters each of which contain life stories of six mathematicians. The players James has chosen to portray are sufficiently representative that their stories, when read in sequence, convey in human terms something of the way in which mathematics developed.

Alain SCHÄRLIG. — **Compter avec des jetons: tables à calculer et tables de compte du Moyen Âge à la Révolution.** — Un vol. broché, 16 × 24, de 283 p. — ISBN 2-88074-542-X. — Prix: SFr. 55.00. — Presses polytechniques et universitaires romandes, Lausanne, 2003.

Le livre s'ouvre sur une introduction en deux temps: une mise en bouche pour décrire les objets, et une très riche documentation montrant combien le jeton a été omniprésent comme moyen de calcul pendant plusieurs siècles en Europe. Il se divise ensuite en deux parties: la première est un traité complet du calcul au moyen de jetons, sur les différents supports utilisés autrefois, et la seconde est un inventaire exhaustif des supports connus à ce jour, tables à calculer et tables de compte, ainsi que tapis de compte, conservés tant des musées que chez des particuliers. Aussi clair et pédagogique que les précédents livres de l'auteur – il ne nécessite notamment pas d'aptitudes particulières en arithmétique – cet ouvrage comble un vide dans un domaine où rien de complet n'avait été publié jusqu'ici.

Michel SERFATI, (Editor). — **De la méthode: recherches en histoire et philosophie des mathématiques.** — Colloques et séminaires. — Un vol. broché, 16 × 22, de 356 p. — ISBN 2-84867-000-2. — Prix: € 22.00. — Presses universitaires Franc-Comtoises, Besançon, 2002.

Cet ouvrage rassemble dix articles d'histoire et philosophie des mathématiques, provenant de communications au séminaire d'épistémologie de l'IREM de l'Université Paris VII,

ainsi qu'à un colloque de philosophie des mathématiques organisé par ce même Institut, tous deux dirigés par Michel Serfati. Il privilégie les questions d'histoire des idées et d'épistémologie par rapport à des descriptions purement historiques, avec pour objectif de mettre en lumière certaines des facettes diverses qui concourent à organiser en mathématiques ce qu'on appelle communément depuis Descartes, la *méthode*. — *Sommaire*: M. Serfati: Le développement de la pensée mathématique du jeune Descartes. — A. Douady: Géométrie dans les espaces de paramètres. Une méthode de géométrisation. — R. Langevin: Gaspard Monge, de la planche à dessin aux lignes de courbure. — A. Revuz: Y a-t-il une méthode en mathématiques? — O. Hudry: Machines de Turing et complexité algorithmique. — I. Grattan-Guinness: La psychologie dans les fondements de la logique et des mathématiques: le cas de Boole, Cantor et Brouwer. Traduction de A. Michel-Pajus. — A. Michel: Thèses d'existence et travail mathématique. — M. Serfati: Analogies et «prolongements» (Écriture symbolique et création d'objets mathématiques, de Leibniz à L. Schwartz). — M. Bitbol: Critères d'existence et preuves d'existence. — J. Mosconi: Quelques difficultés du structuralisme mathématique.

George G. SZPIRO. — **Kepler's conjecture: how some of the greatest minds in history helped solve one of the oldest math problems in the world.** — Un vol. relié, 16×24, de VIII, 296 p. — ISBN 0-471-08601-0. — Prix: £ 18.50. — John Wiley, Hoboken, New Jersey, 2003.

Sir Walter Raleigh simply wanted to know the best and most efficient way to pack cannonballs in the hold of his ship. In 1611, German astronomer Johannes Kepler responded with the obvious answer: by piling them up the same way that grocers stack oranges or melons. For the next four centuries, Kepler's conjecture became the figurative loose cannon in the mathematical world as some of the greatest intellects in history set out to prove his theory. *Kepler's Conjecture* provides a mesmerizing account of this 400-year quest for an answer that would satisfy even the most skeptical mathematical minds.

## *Logique et fondements*

C. Ward HENSON, José LOVINO, Alexander S. KECHRIS, Edward ODELL. (Editors). — **Analysis and logic.** — London Mathematical Society lecture note series, vol. 262. — Un vol. relié, 15×23, de XIV, 267 p. — ISBN 0-521-64681-0. — Prix: £ 29.95. — Cambridge University Press, Cambridge, 2003.

The articles in this book had their origins in three mini-courses offered at the conference "Analyse & Logique" held August 25-29, 1997, at the University of Mons-Hainaut in Mons, Belgium. For a long time there have been rich connections between analysis and logic; these articles bear witness that this relationship is still very active, and continues to be important for both areas. Part one: Ultraproducts in analysis by C. Ward Henson and José Bovino. Part two: Actions of Polish groups and classification problems by Alexander S. Kechris. Part three: On subspaces, asymptotic structure, and distortion of Banach spaces; connections with logic by Edward Odell.

George TOURLAKIS. — **Lectures in logic and set theory, vol. 1: Mathematical logic, vol. 2: Set theory.** — Cambridge studies in advanced mathematics, vol. 82 et 83. — 2 volumes reliés, 16×23,5, de respectivement XI, 328 p. et XIV, 575 p. — ISBN 0-521-75373-2 (vol. 1), 0-521-75374-0 (vol. 2). — Prix: £ 47.50 (vol. 1) et £ 65.00 (vol. 2). — Cambridge University Press, Cambridge, 2003.

This two-volume work bridges the gap between introductory expositions of logic or set theory on one hand, and the research literature on the other. The volumes are written in a user-

friendly conversational lecture style. Volume 1 includes formal proof techniques, a section on applications of compactness (including non-standard analysis), a generous dose of computability and its relation to the incompleteness phenomenon, and the first presentation of a complete proof of Gödel's second incompleteness theorem since Hilbert and Bernays' *Grundlagen*. Volume 2 on formal (ZFC) set theory, incorporates a self-contained "chapter 0" on proof techniques so that it is based on formal logic, in the style of Bourbaki. The emphasis on basic techniques will provide the reader with a solid foundation in set theory and provides a context for the presentation of advanced topics such as absoluteness, relative consistency results, two expositions of Gödel's constructible universe, numerous ways of viewing recursion, and a chapter on Cohen forcing.

## *Théorie des ensembles*

F. William LAWVERE, Robert ROSEBRUGH. — **Sets for mathematics.** — Un vol. broché, 18 × 25, de XI, 261 p. — ISBN 0-521-01060-8. — Prix: £ 19.95. — Cambridge University Press, Cambridge, 2003.

Advanced undergraduate or beginning graduate students need a unified foundation for their study of mathematics. For the first time in a text, this book uses categorical algebra to build such a foundation, starting from intuitive descriptions of mathematically and physically common phenomena and advancing to a precise specification of the nature of categories of sets. Set theory as the algebra of mappings is introduced and developed as a unifying basis for advanced mathematical subjects such as algebra, geometry, analysis, and combinatorics. The formal study evolves from general axioms that express universal properties of sums, products, mapping sets, and natural number recursion. The distinctive features of Cantorian abstract sets, as contrasted with the variable and cohesive sets of geometry and analysis, are made explicit and taken as special axioms. Functor categories are introduced to model the variable sets used in geometry and to illustrate the failure of the axiom of choice. An appendix provides an explicit introduction to necessary concepts from logic, and an extensive glossary provides a window to the mathematical landscape.

## *Analyse combinatoire*

Jiří HERMAN, Jaromir ŠIMŠA, Radan KUČERA. — **Counting and configurations: problems in combinatorics, arithmetic, and geometry.** — Translated by Karl Dilcher. — CMS Books in mathematics, vol. 12. — Un vol. relié, 16 × 24, de x, 392 p. — ISBN 0-387-95552-6. — Prix: € 69.95. — Springer, New York, 2003.

This book presents methods of solving problems in three areas of elementary combinatorial mathematics: classical combinatorics, combinatorial arithmetic, and combinatorial geometry. In each topic, brief theoretical discussions are immediately followed by carefully worked-out examples of increasing degrees of difficulty and by exercises that range from routine to rather challenging. Although this book emphasizes some methods that are not usually covered in beginning university courses, it nevertheless teaches techniques and skills that are useful not only in the specific topics covered here. There are approximately 310 examples and 650 exercises.

L. LOVÁSZ, J. PELIKÁN, K. VESZTERGOMBI. — **Discrete mathematics: elementary and beyond.** — Undergraduate texts in mathematics. — Un vol. broché, 15,5 × 23,5, de IX, 290 p. — ISBN 0-387-95585-2. — Prix: € 39.95. — Springer, New York, 2003.

Discrete mathematics is quickly becoming one of the most important areas of mathematical research, with applications to cryptography, linear programming, coding theory, and the theory of



computing. This book is aimed at undergraduate mathematics and computer science students interested in developing a feeling for what mathematics is all about, where mathematics can be helpful, and what kinds of questions mathematicians work on. The authors discuss a number of selected results and methods of discrete mathematics, mostly from the areas of combinatorics and graph theory, with a little number theory, probability and combinatorial geometry. Wherever possible, the authors use proofs and problem solving to help students understand the solutions to problems. In addition, there are numerous examples, figures, and exercises spread throughout the book.

## *Ordre, treillis*

G. GIERZ, K.H. HOFMANN, K. KEIMEL, J.D. LAWSON, M.W. MISLOVE, D.S. SCOTT. — **Continuous lattices and domains.** — Encyclopedia of mathematics and its applications, vol. 93. — Un vol. relié, 16×24, de xxxvi, 591 p. — ISBN 0-521-80338-1. — Prix: £ 75.00. — Cambridge University Press, Cambridge, 2003.

Information content and programming semantics are just two of the applications of the mathematical concepts of order, continuity and domains. The authors develop the mathematical foundations of partially ordered sets with completeness properties of various degrees, in particular directed complete ordered sets and complete lattices. Uniquely, they focus on partially ordered sets that have an extra order relation, modelling the notion that one element ‘finitely approximates’ another, something closely related to intrinsic topologies linking order and topology. Extensive use is made of topological ideas, both by defining useful topologies on the structures themselves and by developing close connections with numerous aspects of topology. The theory so developed not only has applications to computer science but also within mathematics to such areas as analysis, the spectral theory of algebras and the theory of computability. This authoritative, comprehensive account of the subject will be essential for all those working in the area.

George GRÄTZER. — **General lattice theory.** — Second edition. — Un vol. broché, 17×24, de xix, 663 p. — ISBN 3-7643-6996-5. — Prix: SFr. 118.00. — Birkhäuser, Basel, 2003.

In the present edition of this widely known monograph, the work has been significantly updated and expanded. It contains an extensive new bibliography of 530 items and has been supplemented by eight appendices authored by an exceptional group of experts. The first appendix, written by the author, briefly reviews developments in lattice theory, specifically, the major results of the last 20 years and solutions of the problems proposed in the first edition. The other subjects concern distributive lattices and duality (Brian A. Davey and Hilary A. Priestley), continuous geometries (Friedrich Wehrung), projective lattice geometries (Marcus Greferath and Stefan E. Schmidt), varieties (Peter Jipsen and Henry Rose), free lattices (Ralph Freese), formal concept analysis (Bernhard Ganter and Rudolf Wille), and congruence lattices (Thomas Schmidt in collaboration with the author).

## *Théorie des nombres*

M.A. BENNETT, B.C. BERNDT, N. BOSTON, H.G. DIAMOND, A.J. HILDEBRAND, W. PHILIPP, (Editors). — **Number theory for the millennium.** — Trois vol. brochés, 16×23,5, de respectivement 461 p., 447 p., 450 p. — ISBN 1-56881-126-8 (vol. 1), 1-56881-146-2 (vol. 2), 1-56881-152-7 (vol. 3). — Prix: US\$ 50.00. par volume. — A. K. Peters, Natick, Massachusetts, 2002.

These proceedings review some of the major number theory achievements of the 20<sup>th</sup> century. In addition to survey papers by invited speakers the volume contains numerous original

research papers, many of which will serve as a starting point for further work. This conference builds on a strong tradition of international meetings in number theory at the University of Illinois in Urbana. The timing at the turn of the century provided an opportunity to invite a large number of researchers and an incentive to solicit substantial contributions from their current work. The Millennium Conference on Number Theory was held May 21-26, 2000 on the campus of the University of Illinois at Urbana-Champaign. A total of 276 mathematicians from 30 countries were present at the meeting.

M.A. BENNETT, B.C. BERNDT, N. BOSTON, H.G. DIAMOND, A.J. HILDEBRAND, W. PHILIPP, (Editors). — **Surveys in number theory: papers from the Millennial Conference on Number Theory.** — Un vol. broché,  $15,5 \times 23$ , de vii, 363 p. — ISBN 1-56881-162-4. — Prix: US\$ 30.00. — A.K. Peters, Natick, Massachusetts, 2003.

The Millennial Conference was held on May 21-26, 2000 on the campus of the University of Illinois at Urbana-Champaign. The proceedings of this conference, containing 72 papers based on lectures given at that conference, have been published separately in three volumes under the title *Number Theory for the Millennium*. The present volume contains fourteen of these papers which represent broad surveys of topics in number theory or related areas. Presented and compiled by a group of international experts, these papers provide a current view of the state of the art and an outlook into the future of number theory research.

Paul ERDŐS, János SURÁNYI. — **Topics in the theory of numbers.** — Undergraduate texts in mathematics. — Un vol. relié,  $16 \times 24$ , de xviii, 287 p. — ISBN 0-387-95320-5. — Prix: € 49.95. — Springer, New York, 2003.

This rather unique book is a guided tour through number theory. While most introductions to number theory provide a systematic and exhaustive treatment of the subject, the authors have chosen instead to illustrate the many varied subjects by associating recent discoveries, interesting methods, and unsolved problems. In particular, we read about combinatorial problems in number theory, a branch of mathematics co-founded and popularized by Paul Erdős. János Surányi's vast teaching experience successfully complements Paul Erdős's ability to initiate new directions of research by suggesting new problems and approaches.

Georges GRAS. — **Class field theory: from theory to practice.** — Springer monographs in mathematics. — Un vol. relié,  $16 \times 24$ , de xiii, 491 p. — ISBN 3-540-44133-6. — Prix: € 79.95. — Springer, Berlin, 2003.

Global class field theory is a major achievement of algebraic number theory, based on the functorial properties of the reciprocity map and the existence theorem. The author works out the consequences and the practical use of these results by giving detailed studies and illustrations of classical subjects (classes, idèles, ray class fields, symbols, reciprocity laws, Hasse's principles, the Grunwald-Wang theorem, Hilbert's towers,...). He also proves some new or less-known results (reflection theorem, structure of the Abelian closure of a number field) and lays emphasis on the invariant  $T_p$  of Abelian  $p$ -ramification, which is related to important Galois cohomology properties and  $p$ -adic conjectures. This book, intermediary between the classical literature published in the sixties and the recent computational literature, gives much material in an elementary way, and is suitable for students, researchers, and all who are fascinated by this theory.

Friedrich von HAESELER. — **Automatic sequences.** — De Gruyter expositions in mathematics, vol. 36. — Un vol. relié,  $18 \times 24,5$ , de 191 p. — ISBN 3-11-015629-6. — Prix: € 78.50. — Walter de Gruyter, Berlin, 2003.

Automatic sequences are sequences which are, in a well-defined manner, produced by a finite automaton. The concept of automatic sequences has applications in algebra, number the-

ory, finite automata, formal languages, and combinatorics of words. The goal of this text is to provide a unified approach to automatic sequences over a group. The text deals with several aspects of automatic sequences: substitutions and finite automata, a general notion of automaticity, elementary properties of automatic sequences, automatic functions and their properties, an algebraic approach to automatic sequences.

G. J. O. JAMESON. — **The prime number theorem.** — London Mathematical Society student texts, vol. 53. — Un vol. broché,  $15 \times 22,5$ , de x, 252 p. — ISBN 0-521-89110-8 (relié: 0-521-81411-1). — Prix: £ 18.95 (relié: £ 50.00). — Cambridge University Press, Cambridge, 2003.

The prime number theorem gives an asymptotic expression for the number of primes less than a given number. It is unquestionably one of the great theorems of mathematics. This book aims to give a simple and clear exposition of the theorem and its proof, treating it as a subject in its own right rather than a fringe topic of a wider subject. The book gives an easy-paced and thorough account of the concepts and methods needed. Topics are introduced in a natural order, avoiding unmotivated definitions. The main prerequisites are standard undergraduate courses on real and complex analysis.

Serge PERRINE. — **La théorie de Markoff et ses développements.** — Un vol. relié,  $17,5 \times 25$ , de VII, 326 p. — ISBN 2-909467-05-8. — Tessier & Ashpool, Guildford, Surrey et Chantilly, Oise, 2002.

Un formalisme général: Sur les suites et les fractions continues. Sur les matrices de suites. Sur les formes quadratiques. L'équation de Markoff généralisée. Quelques conséquences. — Bouquets, forêts et arbres: Le principe d'analyse. Les involutions conservant l'équation. Les bouquets de solutions. Finitude du nombre de bouquets. Équations équilibrées et triplets de Cohn. Le lien entre bouquets et arbres — Analyse du spectre de Markoff: Première décomposition. Seconde décomposition. Dépendance mutuelle des suites  $X^2$  et  $T$ . Recollement des arborescences. — Vers les courbes elliptiques: Approche par les corps quadratiques. Équations pointues et dégénérées. Équation d'un réseau. Lien avec les courbes elliptiques. Compléments sur la surface cubique. Compléments géométriques. — Tores percés conformes: Géométrie du demi plan de Poincaré. Construction de tores percés conformes. Représentations paramétriques. Cône attaché à un tore percé. Étude des tores percés paraboliques. Réduction des tores percés paraboliques. Perspectives. — La théorie de Markoff classique: Présentation matricielle de la théorie. D'autres présentations matricielles. Identification du groupe concerné. Relation avec le groupe libre  $F_2$ . Equivalence des couples de générateurs. Conséquences pour le groupe  $\text{Aut}(F_2)$ . Présentations du groupe  $\text{Aut}(F_2)$ . L'interprétation de l'arbre de Markoff. Applications à  $GL(2, \mathbf{Z})$ . — Géométrie conforme des surfaces: La notion de surface de Riemann. Des exemples de surfaces de Riemann. Revêtements universels et groupes de Poincaré. Groupes fuchsien. La théorie de Teichmüller. Quelques applications. Cas du tore  $\mathbf{T}$ . Cas du tore percé à une piqure  $\mathbf{T} \setminus \{p\}$ . Approche par les fibrés vectoriels.

Igor SHPARLINSKI. — **Cryptographic applications of analytic number theory: complexity lower bounds and pseudorandomness.** — Progress in computer science and applied logic, vol. 22. — Un vol. relié,  $16 \times 24$ , de VIII, 411 p. — ISBN 3-7643-6654-0. — Prix: SFr. 148.00. — Birkhäuser, Basel, 2003.

The book introduces new ways of using analytic number theory in cryptography and related areas, such as complexity theory and pseudorandom number generation. *Key topics and features:* Various lower bounds on the complexity of some number theoretic and cryptographic problems, associated with classical schemes such as RSA, Diffie-Hellman, DSA as well as with

relatively new schemes like XTR and NTRU. — A series of very recent results about certain important characteristics (period, distribution, linear complexity) of several commonly used pseudorandom number generators, such as the RSA generator, Blum-Blum-Shub generator, Naor-Reingold generator, inversive generator, and others. — One of the principal tools is bounds of exponential sums, which are combined with other number theoretic methods such as lattice reduction and sieving. — A number of open problems of different levels of difficulty and proposals for further research. — An extensive and up-to-date bibliography.

## *Corps et polynômes*

Toma ALBU. — **Cogalois theory.** — Pure and applied mathematics, vol. 252. — Un vol. relié, 15,5 × 23,5, de XII, 341 p. — ISBN 0-8247-0949-7. — Prix: US\$ 150.00. — Marcel Dekker, New York, 2003.

This volume offers a systematic, comprehensive investigation of field extensions, finite or not, that possess a cogalois correspondence. The subject, called cogalois theory, is somewhat dual to the very classical Galois theory dealing with field extensions possessing a Galois correspondence. — *Contents:* Finite cogalois theory: Preliminaries. Kneser extensions. Cogalois extensions. Strongly Kneser extensions. Galois  $G$ -cogalois extensions. Radical extensions and crossed homomorphisms. Examples of  $G$ -cogalois extensions.  $G$ -cogalois extensions and primitive elements. Applications to algebraic number fields. Connections with graded algebras and Hopf algebras. — Infinite cogalois theory: Infinite Kneser extensions. Infinite  $G$ -cogalois extensions. Infinite Kummer theory. Infinite Galois theory and Pontryagin duality. Infinite Galois  $G$ -cogalois extensions.

Christian U. JENSEN, Arne LEDET, Noriko YUI. — **Generic polynomials: constructive aspects of the inverse Galois problem.** — Mathematical Science Research Institute publications, vol. 45. — Un vol. relié, 16 × 24, de IX, 258 p. — ISBN 0-521-81998-9. — Prix: £ 45.00. — Cambridge University Press, Cambridge, 2002.

This book describes a constructive approach to the inverse Galois problem: Given a finite group  $G$  and a field  $K$ , determine whether there exists a Galois extension of  $K$  whose Galois group is isomorphic to  $G$ . Further, if there is such a Galois extension, find an explicit polynomial over  $K$  whose Galois group is the prescribed group  $G$ . The main theme of the book is an exposition of a family of “generic” polynomials for certain finite groups, which give all Galois extensions having the required group as their Galois group. The existence of such generic polynomials is discussed, and where they do exist, a detailed treatment of their construction is given. The book also introduces the notion of “generic dimension” to address the problem of the smallest number of parameters required by a generic polynomial.

Teo MORA. — **Solving polynomial equation systems I: the Kronecker-Duval philosophy.** — Encyclopedia of mathematics and its applications, vol. 88. — Un vol. relié, 16 × 24, de XIII, 423 p. — ISBN 0-521-81154-6. — Prix: £ 60.00. — Cambridge University Press, Cambridge, 2003.

Polynomial equations have been long studied, both theoretically and with a view to solving them. Until recently, manual computation was the only solution method and the theory was developed to accommodate it. With the advent of computers, the situation changed dramatically. Many classical results can be more usefully recast within a different framework

which in turn lends itself to further theoretical development tuned to computation. This first book in a trilogy is devoted to the new approach. It is a handbook covering the classical theory of finding roots of a univariate polynomial, emphasising computational aspects, especially the representation and manipulation of algebraic numbers, enlarged by more recent representations like the Duval Model and the Thom Codification. Mora aims to show that solving a polynomial equation really means finding algorithms that help one manipulate roots rather than simply computing them; to that end he also surveys algorithms for factorizing univariate polynomials.

## *Géométrie algébrique*

David M. GOLDSCHMIDT. — **Algebraic functions and projective curves.** — Graduate texts in mathematics, vol. 215. — Un vol. relié, 16×24, de xvi, 179 p. — ISBN 0-387-95432-5. — Prix: €44.95. — Springer, New York, 2002.

This book provides a self-contained exposition of the theory of algebraic curves without requiring any of the prerequisites of modern algebraic geometry. The self-contained treatment makes this important and mathematically central subject accessible to non specialists. At the same time, specialists in the field may be interested to discover several unusual topics. Among these are Tate's theory of residues, higher derivatives and Weierstrass points in characteristic  $p$ , the Stohr-Voloch proof of the Riemann hypothesis, and a treatment of inseparable residue field extensions. Although the exposition is based on the theory of function fields in one variable, the book is unusual in that it also covers projective curves, including singularities and a section on plane curves.

Claire VOISIN. — **Hodge theory and complex algebraic geometry, vol. 1.** — Cambridge studies in advanced mathematics, vol. 76. — Un vol. relié, 15,5×23,5, de ix, 322 p. — ISBN 0-521-80260-1. — Prix: £55.00. — Cambridge University Press, Cambridge, 2002.

This first volume provides a modern introduction to Kählerian geometry and Hodge theory. It starts with basic material on complex variables, complex manifolds, holomorphic vector bundles, sheaves, and cohomology theory, the latter being treated in more theoretical way than is usual in geometry, and culminates with the Hodge decomposition theorem. In between, the author proves the Kähler identities, which leads to the hard Lefschetz theorem and the Hodge index theorem. The second part of the book investigates the meaning of these results in several directions. It introduces the notion of Hodge structure, the (logarithmic) de Rham complex, Frölicher spectral sequences, and mixed Hodge structures. The book ends with a treatment of deformations of the complex structure, Gauss-Manin connection, and variations of Hodge structure, on the one hand, and the study of algebraic cycles on the other. These topics will be further developed in the next volume.

## *Anneaux et algèbres*

Ivan CHAJDA, Günther EIGENTHALER, Helmut LÄNGER. — **Congruence classes in universal algebra.** — Research and exposition in mathematics, vol. 26. — Un vol. broché, 17×24, de x, 217 p. — ISBN 3-88538-226-1. — Prix: €28.00. — Heldermann Verlag, Lemgo, Germany, 2003.

Congruence relations play an important role when investigating universal algebras. On the one hand, the structure of the congruence lattice of a given algebra reveals much information on

the underlying algebra. On the other hand, via congruence relations quotient algebras can be formed which may have “nicer” properties than the original algebras. Moreover, in many cases congruences are determined by some of their classes. For instance in the case of groups, rings and Boolean algebras, congruences are determined by each single one of their classes. The aim of this book is to present the most important results concerning congruence classes, dependences between them as well as connections to subalgebras.

Leonid VAINERMAN, (Editor). — **Locally compact quantum groups and groupoids: proceedings of the Meeting of Theoretical Physicists and Mathematicians, Strasbourg, 2002.** — IRMA lectures in mathematics and theoretical physics, vol. 2. — Un vol. broché,  $17 \times 24$ , de 247 p. — ISBN 3-11-017690-4. — Prix: € 34.53. — Walter de Gruyter, Berlin, 2003.

This proceedings book contains seven refereed research papers on locally compact quantum groups and groupoids by leading experts in the respective fields. Topics covered are: constructions and examples of locally compact quantum groups and their multiplicative unitaries; duality theory for locally compact quantum groups; quantum groupoids, especially coming from extensions of operator algebras and rings. Many mathematical results are motivated by problems in theoretical physics. Historical remarks set the results presented in perspective.

## ***Théorie des groupes et généralisations***

Alexander LUBOTZKY, Dan SEGAL. — **Subgroup growth.** — Progress in mathematics, vol. 212. — Un vol. relié,  $16 \times 24$ , de XXI, 453 p. — ISBN 3-7643-6989-2. — Prix: SFr. 148.00. — Birkhäuser, Basel, 2003.

Subgroup growth studies the distribution of subgroups of finite index in a group as a function of the index. In the last two decades this topic has developed into one of the most active areas of research in infinite group theory; this book is a systematic and comprehensive account of the substantial theory which has emerged. As well as determining the range of possible “growth types”, for finitely generated groups in general and for groups in particular classes such as linear groups, a main focus of the book is on the tight connection between the subgroup growth of a group and its algebraic structure. A wide range of mathematical disciplines play a significant role in this work; as well as various aspects of infinite group theory, these include finite simple groups and permutation groups, profinite groups, arithmetic groups and strong approximation, algebraic and analytic number theory, probability, and  $p$ -adic model theory. The book concludes with a list of over 60 challenging open problems that will stimulate further research in this rapidly growing subject.

Katrin TENT, (Editor). — **Tits buildings and the model theory of groups.** — London Mathematical Society lecture note series, vol. 291. — Un vol. broché,  $15 \times 23$ , de x, 298 p. — ISBN 0-521-01063-2. — Prix: £ 29.95. — Cambridge University Press, Cambridge, 2003.

This volume contains selected papers by leading researchers from a conference held in Würzburg in 2000. The first part of the book provides a general introduction to many aspects of buildings and their geometries, based on short lecture courses given at the conference. The rest of the book comprises survey and research articles on model theoretic results and techniques, showing the vitality and richness of these branches of mathematics. Among the most fruitful techniques, amalgamation constructions à la Hrushovski are explained and classified as they continue to play an important role both in model theory and geometry. The articles succeed in demonstrating the close connection between geometry, group theory and model theory.

## *Mesure et intégration*

E. PAP, (Editor). — **Handbook of measure theory**. — Deux vol. reliés, 17×25, de XI, 1607 p. — ISBN 0-444-50263-7 (vol. 1+2). — Prix: €260.00. — Elsevier, Amsterdam, 2002.

The main goal of this handbook is to survey measure theory with its many different branches and its relations with other areas of mathematics. Mostly aggregating many classical branches of measure theory, the aim of the handbook is also to cover new fields, approaches and applications which support the idea of “measure” in a wider sense, e.g. the ninth part of the handbook. Although chapters are written of surveys in the various areas, they contain many special topics and challenging problems valuable for experts and rich sources of inspiration. Mathematicians from other areas as well as physicists, computer scientists, engineers and econometrists will find useful results and powerful methods for their research. The reader may find in the handbook many close relations to other mathematical areas: real analysis, probability theory, statistics, ergodic theory, functional analysis, potential theory, topology, set theory, geometry, differential equations, optimization, variational analysis, decision making and others. The handbook is a rich source of relevant references to articles, books and lecture notes and it contains for the reader’s convenience an extensive subject and author index. — *Contents*: Classical measure theory. — Vector measures. — Integration theory. — Topological aspects of measure theory. — Order and measure theory. — Geometric measure theory. — Relation to transformation and duality. — Relation to the foundations of mathematics. — Non-additive measures.

## *Fonctions d’une variable complexe*

R. KÜHNAU, (Editor). — **Handbook of complex analysis, vol. 1: Geometric function theory**. — Un vol. relié, 17×24,5, de XII, 536 p. — ISBN 0-444-82845-1. — Prix: €135.00. — Elsevier, Amsterdam, 2002.

Geometric function theory is a central part of complex analysis (one complex variable). The *Geometric Function Theory* volume deals with this field and its many ramifications and relations to other areas of mathematics and physics. The theory of conformal and quasiconformal mappings plays a central role in this handbook, for example a priori estimates for these mappings which arise from solving extremal problems, and constructive methods are considered. As a new field the theory of circle packings which goes back to P. Koebe is included. The handbook should be useful for experts as well as for mathematicians working in other areas, as well as for physicists and engineers.

Terry SHEIL-SMALL. — **Complex polynomials**. — Cambridge studies in advanced mathematics, vol. 75. — Un vol. relié, 16×24, de XVIII, 428 p. — ISBN 0-521-40068-6. — Prix: £65.00. — Cambridge University Press, Cambridge, 2002.

This book studies the geometric theory of polynomials and rational functions in the plane. Any theory in the plane should make full use of the complex numbers and thus the early chapters build the foundations of complex variable theory, melding together ideas from algebra, topology and analysis. In fact, throughout the book, the author introduces a variety of ideas and constructs theories around them, incorporating much of the classical theory of polynomials as he proceeds. These ideas are used to study a number of unsolved problems, bearing in mind that such problems indicate the current limitations of our knowledge and present challenges for the

future. However, theories also lead to solutions of some problems and several such solutions are given including a comprehensive account of the geometric convolution theory.

Claude WAGSCHAL. — **Fonctions holomorphes. Équations différentielles: exercices corrigés.** — Collection méthodes. — Un vol. broché, 15×22, de xvii, 457 p. — ISBN 2-7056-6456-4. — Prix: €40.00. — Hermann, Paris, 2003.

Le premier chapitre de cet ouvrage est consacré à la théorie des fonctions holomorphes, essentiellement d'une variable complexe. On y trouvera un exposé des notions de topologie algébrique (homotopie, revêtement, etc.) indispensables pour comprendre certains aspects de cette théorie, en particulier tout ce qui se rattache au prolongement analytique. Il comporte également de très nombreux exercices de difficulté variable dont les solutions sont données en fin de chapitre. Le second chapitre est une introduction à la théorie des équations différentielles, aussi bien dans le champ réel que dans le domaine complexe. On aborde en particulier l'étude des équations différentielles à points singuliers réguliers: théorème de Fuchs, théorèmes d'indice (Komatsu-Malgrange). On y traite également des équations aux dérivées partielles du premier ordre dont la résolution se réduit à celle de leur système caractéristique (méthodes de Cauchy) et, enfin, on résout le problème de Cauchy pour des équations aux dérivées partielles holomorphes d'ordre supérieur (théorème de Cauchy-Kowalevsky).

### *Equations différentielles ordinaires*

Valerii I. GROMAK, Ilpo LAINE, Shun SHIMOMURA. — **Painlevé differential equations in the complex plane.** — De Gruyter studies in mathematics, vol. 28. — Un vol. relié, 18×24,5, de viii, 303 p. — ISBN 3-11-017379-4. — Prix: €82.24. — Walter de Gruyter, Berlin, 2002.

This book is the first comprehensive treatment of the matter. Starting with a rigorous presentation for the meromorphic nature of their solutions, the Nevanlinna theory will be applied to offer a detailed exposition of growth aspects and value distribution of Painlevé transcendents. The subsequent main part of the book is devoted to topics of classical background such as representations and expansions of solutions, solutions of special type like rational and special transcendental solutions, Bäcklund transformations and higher order analogues, treated separately for each of these six equations. The final chapter offers a short overview of applications of Painlevé equations, including an introduction to their discrete counterparts.

### *Systèmes dynamiques et théorie ergodique*

John BANKS, Valentina DRAGAN, Arthur JONES. — **Chaos: a mathematical introduction.** — Australian Mathematical Society lecture series, vol. 18. — Un vol. broché, 15×23, de xi, 294 p. — ISBN 0-521-53104-7. — Prix: £27.95. — Cambridge University Press, Cambridge, 2003.

When new ideas such as chaos first move into the mathematical limelight, the early textbooks tend to be very difficult. The concepts are new and it takes time to find ways to present them in a form digestible to the average student. This process may take a generation, but eventually, what originally seemed far too advanced for all but the most mathematically sophisticated becomes accessible to a much wider readership. This book takes major steps along that path of generational change. It presents ideas about chaos in discrete time dynamics in a form that should be accessible to anyone who has taken a first course in undergraduate calculus. More remarkably, it manages to do so without discarding a commitment to mathematical substance and rigour.



Peter GRABNER, Wolfgang WOESS, (Editors). — **Fractals in Graz 2001: analysis – dynamics – geometry – stochastic.** — Trends in mathematics. — Un vol. relié,  $17 \times 24$ , de XI, 162 p. — ISBN 3-7643-7006-8. — Prix: SFr. 98.00. — Birkhäuser, Basel, 2003.

The volume presents a multitude of different directions of active current research linked with the modern theory of fractal structures. All papers were written upon invitation by the editors. The book is addressed to mathematicians and scientists who are interested in any of the following topics: fractal dimensions, fractal energies, fractal groups, stochastic processes on fractals, self-similarity, spectra of random walks, tilings, analysis on fractals, dynamical systems. The readers will be introduced to the most recent results and problems on these subjects. Both researchers and graduate students will benefit from the clear expositions.

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

Antoni ZYGMUND. — **Trigonometric series.** — With a foreword by Robert Fefferman. — Third edition, volumes I and II combined. — Cambridge mathematical library. — Un vol. broché,  $15 \times 23$ , de XIII, 383 p. et VII, 364 p. — ISBN 0-521-89053-5. — Prix: £ 39.95. — Cambridge University Press, Cambridge, 2003.

A greatly enlarged second edition published by Cambridge in two volumes in 1959 took full account of developments in trigonometric series, Fourier series and related branches of pure mathematics since publication of the original edition. The two volumes are here bound together. Volume I, containing the completely rewritten material of the original work, deals with trigonometric series and Fourier series – auxiliary results: Fourier coefficients – elementary theorems on the convergence of  $S_n$ ; summability of Fourier series; classes of functions and Fourier series; special trigonometric series; the absolute convergence of trigonometric series; complex methods in Fourier series; divergence of Fourier series; Riemann's theory of trigonometric series. Volume II provides much material previously unpublished in book form, and covers trigonometric interpolation; differentiation of series – generalized derivatives; interpolation of linear operation – more about Fourier coefficients; convergence and summability almost everywhere; complex methods; applications of the Littlewood-Paley function to Fourier series; Fourier integrals; a topic in multiple Fourier series.

### *Analyse fonctionnelle*

Pere ARA, MARTIN MATHIEU. — **Local multipliers of  $C^*$ -algebras.** — Springer monographs in mathematics. — Un vol. relié,  $16 \times 24$ , de XII, 319 p. — ISBN 1-85233-237-9. — Prix: € 86.95. — Springer, London, 2003.

The theme of this book is operator theory on  $C^*$ -algebras. The main novel tool employed is the concept of local multipliers. The book serves two purposes. The first part provides the reader with a thorough introduction to the theory of local multipliers. Only a minimal knowledge of algebra and analysis is required, as the prerequisites in both non-commutative ring theory and basic  $C^*$ -algebra theory are presented in the first chapter. In the second part, local multipliers are used to obtain a wealth of information on various classes of operators on  $C^*$ -algebras, including (groups of) automorphisms, derivations, elementary operators, Lie isomorphisms and Lie derivations, as well as others. Many of the results appear in print for the first time. The authors have made an effort to avoid intricate technicalities thus some of the results are not pushed to their utmost generality. Several open problems are discussed, and hints for further developments are given.

Dorothee HAROSKE, Thomas RUNST, Hans-Jürgen SCHMEISSER, (Editors). — **Function spaces, differential operators and nonlinear analysis: the Hans Triebel anniversary volume.** — Un vol. relié, 17,5×24, de XII, 474 p. — ISBN 3-7643-6935-3. — Prix: SFr. 138.00. — Birkhäuser, Basel, 2003.

This conference (International Conference “Function spaces, Differential Operators and Nonlinear Analysis” held in Teistungen, Thuringia / Germany, from June 28 to July 4, 2001, in honour of his 65<sup>th</sup> birthday) was a very special event because it celebrated Hans Triebel’s extraordinary impact on mathematical analysis. The development of the modern theory of function spaces in the last 30 years and its application to various branches in both pure and applied mathematics is deeply influenced by his lasting contributions. In a series of books Hans Triebel has given systematic treatments of the theory of function spaces from different points of view, thus revealing its interdependence with interpolation theory, harmonic analysis, partial differential equations, nonlinear operators, entropy, spectral theory and, most recently, analysis on fractals.

W.B. JOHNSON, J. LINDENSTRAUSS, (Editors). — **Handbook of the geometry of Banach spaces, volume 1.** — Un vol. relié, 17,5×24,5, de X, 1005 p. — ISBN 0-444-82842-7. — Prix: € 159.00. — Elsevier, Amsterdam, 2001.

The handbook presents an overview of most aspects of modern Banach space theory and its applications. The up-to-date surveys, authored by leading research workers in the area, are written to be accessible to a wide audience. In addition to presenting the state of the art of Banach space theory, the surveys discuss the relation of the subject with such areas as harmonic analysis, complex analysis, classical convexity, probability theory, operator theory, combinatorics, logic, geometric measure theory, and partial differential equations. The handbook begins with a chapter on basic concepts in Banach space theory which contains all the background needed for reading any other chapter in the handbook. Each of the twenty one articles in this volume after the basic concepts chapter is devoted to one specific direction of Banach space theory or its applications. Each article contains a motivated introduction as well as an exposition of the main results, methods and open problems in its specific direction. Most have an extensive bibliography. Many articles contain new proofs of known results as well as expositions of proofs which are hard to locate in the literature or are only outlined in the original research papers.

L. P. LEBEDEV, I. I. VOROVICH. — **Functional analysis in mechanics.** — Springer monographs in mathematics. — Un vol. relié, 16×24, de IX, 238 p. — ISBN 3-387-95519-4. — Prix: € 69.95. — Springer, Berlin, 2003.

This book covers functional analysis and its applications to continuum mechanics. The presentation is concise but complete, and is intended for readers in continuum mechanics who wish to understand the mathematical underpinnings of the discipline. Graduate students and researchers in mathematics, physics, and engineering wishing to find applications of functional analysis may find this text particularly useful. Detailed solutions of the exercises are provided in an appendix.

L. LEINDLER, F. SCHIPP, J. SZABADOS, (Editors). — **Functions, series, operators: Alexits Memorial Conference.** — Un vol. relié, 17,5×24, de 472 p. — ISBN 963-9453-005. — János Bolyai Mathematical Society, Budapest, 2002.

The János Bolyai Mathematical Society organized an International Conference *Functions, series, operators* in Budapest between August 9 and 13, 1999 to honor the hundredth anniversary of the birth of Professor George Alexits (1899-1978). 80 participants from 17 countries delivered 68 lectures in different fields of real and complex function theory, operators, approximation theory, functional analysis. The present volume contains papers meticulously selected

from the lectures presented during the conference. The first paper gives an account of the life of Alexits and his work in function theory (by F. Móricz and K. Tandori). It is followed by three invited papers (by Bl. Sendov, H. Triebel, S. Yano). These as well as the subsequent contributed papers were thoroughly refereed according to the strict standards of international periodicals. All contributed papers are original works not published elsewhere.

Vern PAULSEN. — **Completely bounded maps and operator algebras.** — Cambridge studies in advanced mathematics, vol. 78. — Un vol. relié, 16×24, de XII, 300 p. — ISBN 0-521-81669-6. — Prix: £ 47.50. — Cambridge University Press, Cambridge, 2003.

In this book the reader is provided with a tour of the principal results and ideas in the theories of completely positive maps, completely bounded maps, dilation theory, operator spaces, and operator algebras, together with some of their main applications. The author assumes only that the reader has a basic background in functional analysis and  $C^*$ -algebras, and the presentation is self-contained and paced appropriately for graduate students new to the subject. The book could be used as a text for a course or for independent reading; with this in mind, many exercises are included. Experts will also want this book for their library, since the author presents new and simpler proofs of some of the major results in the area, and many applications are also included.

## ***Théorie des opérateurs***

Sergio ALBEVERIO, Michael DEMUTH, Elmar SCHROHE, Bert-Wolfgang SCHULZE, (Editors). — **Parabolicity, Volterra calculus, and conical singularities.** — A volume of *Advances in partial differential equations*. — Operator theory: advances and applications, vol. 138. — Un vol. relié, 17×24, de IX, 358 p. — ISBN 3-7643-6906-X. — Prix: SFr. 160.00. — Birkhäuser, Basel, 2003.

This volume highlights the analysis on noncompact and singular manifolds within the framework of the cone calculus with asymptotics. — *Contents*: Thomas Krainer: Volterra families of pseudodifferential operators. — Thomas Krainer: The calculus of Volterra Mellin pseudodifferential operators with operator-valued symbols. — Thomas Krainer and Bert-Wolfgang Schulze: On the inverse of parabolic systems of partial differential equations of general form in an infinite space-time cylinder. — Ingo Witt: On the factorization of meromorphic Mellin symbols. — David Kapanadze, Bert-Wolfgang Schulze, and Ingo Witt: Coordinate invariance of the cone algebra with asymptotics.

## ***Calcul des variations***

Gianni DAL MASO, Franco TOMARELLI, (Editors). — **Variational methods for discontinuous structures.** — International Workshop at Villa Erba (Cernobio), Italy, July 2001. — Progress in nonlinear differential equations and their applications, vol. 51. — Un vol. relié, 16×24, de X, 185 p. — ISBN 3-7643-6913-2. — Birkhäuser, Basel, 2002.

This volume contains the proceedings of the International Workshop on Variational Methods for Discontinuous Structures, held at Villa Erba Antica (Cernobio), on the Lago di Como, July 4-6, 2001. Some of the talks were devoted to differential or variational modelling of image segmentation, occlusion and textures synthesizing in image analysis, variational description of micro-magnetic materials, dimension reduction and structured deformations in elasticity and plasticity, phase transitions, irrigation and drainage, evolution of crystalline shapes. In most cases theoretical and numerical analysis of these models were provided. Other talks were dedicated to specific problems of the calculus of variations: variational theory of weak or

lower-dimensional structures, optimal transport problems with free Dirichlet regions, higher order variational problems, symmetrization in the BV framework. This volume contains contributions by 12 of the 16 speakers invited to deliver lectures in the workshop.

## **Géométrie**

Pascal DUPONT. — **Introduction à la géométrie : géométrie linéaire et géométrie différentielle.** — Bibliothèque des universités – Mathématiques. — Un vol. broché,  $18 \times 25$ , de 691 p. — ISBN 2-8041-4072-5. — Prix : € 64.95. — De Boeck Université, Bruxelles, 2002.

Cet ouvrage présente trois importantes structures géométriques : espaces affines, espaces euclidiens, espaces projectifs et quatre types d'êtres géométriques fondamentaux : quadriques, courbes, surfaces, arcs riemanniens. Les trois premiers chapitres abordent les sous-espaces, les transformations préservant la structure, l'introduction des coordonnées. Le chapitre quatre étudie les quadriques d'un point de vue affine, puis euclidien, puis projectif. Une attention particulière est accordée aux coniques aussi qu'aux quadriques de l'espace tridimensionnel. Dans les trois derniers chapitres, le principal outil de travail est le calcul différentiel. Courbes et surfaces sont étudiées d'abord pour leurs propriétés affines et ensuite pour leurs propriétés métriques. Le dernier chapitre n'introduit pas vraiment la géométrie riemannienne, mais familiarise le lecteur à son langage et à son mode de pensée. Chaque notion est illustrée de multiples exemples et contre-exemples. Plus de 600 exercices et problèmes, la plupart avec solutions sont proposés.

Werner FENCHEL, Jakob NIELSEN. — **Discontinuous groups of isometries in the hyperbolic plane.** — Edited by ASMUS L. SCHMIDT. — De Gruyter studies in mathematics, vol. 29. — Un vol. relié,  $18 \times 24,5$ , de XXI, 364 p. — ISBN 3-11-017526-6. — Prix : € 78.50. — Walter de Gruyter, Berlin, 2003.

This is an introductory textbook on isometry groups of the hyperbolic plane. Interest in such groups dates back more than 120 years. Examples appear in number theory (modular groups and triangle groups), the theory of elliptic functions, and the theory of linear differential equations in the complex domain (giving rise to the alternative name Fuchsian groups). The current book is based on what became known as the famous Fenchel-Nielsen manuscript. Jakob Nielsen (1890-1959) started this project well before World War II, and his interest arose through his deep investigations on the topology of Riemann surfaces and from the fact that the fundamental group of a surface of genus greater than one is represented by such a discontinuous group. Werner Fenchel (1905-1988) joined the project later and overtook much of the preparation of the manuscript. The present book is special because it avoids the use of matrices to represent Moebius maps.

Greg N. FREDERICKSON. — **Dissections: plane and fancy.** — Un vol. broché,  $17,5 \times 23,5$ , de XI, 310 p. — ISBN 0-521-52582-9 (relié : 0-521-57197-9). — Prix : £ 16.95 (relié : £ 32.50). — Cambridge University Press, Cambridge, 2002.

Can you cut an octagon into 5 pieces and rearrange them into a square? How about turning a star into a pentagon? These are just two of the many challenges of geometric dissections, the mathematical art of cutting figures into pieces that can be rearranged to form other figures, using as few pieces as possible. This book shows you many ingenious ways to solve these problems and the beautiful constructions you can create. Through the ages, geometric dissections have fascinated puzzle fans and great mathematicians alike. Here you will find dissections known to Plato alongside exciting new discoveries. The author poses puzzles for you to solve, but this is much more than a puzzle book. He explains solution methods carefully: new and old types of slides, strips, steps, tessellations, and exploration of star and polygon structures. You need only a basic knowledge of high school geometry.

Thomas HULL, (Editor). — **Origami<sup>3</sup>: third International Meeting of Origami Science, Mathematics, and Education.** — Un vol. broché, 15,5 × 23, de XI, 353 p. — ISBN 156881-181-0. — Prix: US\$ 49.00. — A. K. Peters, Natick, Massachusetts, 2002.

Going beyond folding instructions, Origami<sup>3</sup> takes a unique and scholarly look at the implications and applications of this art. This collection demonstrates the diversity of interests that origami inspires, with papers discussing the theoretical and mathematical foundations of paper folding, applicable origami design techniques, and the use of origami as a teaching tool for mathematics and language. From the table of contents: computer tools and algorithms for Origami tessellation design; paper folding constructions in Euclidean geometry: an exercise in thrift; the application of Origami science to map and atlas design; fold paper and enjoy math; Origamics; Origami and the adult ESL learner.

Peter McMULLEN, Egon SCHULTE. — **Abstract regular polytopes.** — Encyclopedia of mathematics and its applications, vol. 92. — Un vol. relié, 16,5 × 24, de XIII, 551 p. — ISBN 0-521-81496-0. — Prix: £ 75.00. — Cambridge University Press, Cambridge, 2002.

Abstract regular polytopes stand at the end of more than two millennia of geometrical research, which began with regular polygons and polyhedra. They are highly symmetric combinatorial structures with distinctive geometric, algebraic, or topological properties, in many ways more fascinating than traditional regular polytopes and tessellations. The rapid development of the subject in the past twenty years has resulted in a rich new theory, featuring an attractive interplay of mathematical areas, including geometry, combinatorics, group theory, and topology. Abstract regular polytopes and their groups provide an appealing new approach to understanding geometric and combinatorial symmetry.

Chris PRITCHARD, (Editor). — **The changing shape of geometry: celebrating a century of geometry and geometry teaching.** — Edited on behalf of the Mathematical Association. — Spectrum series. — Un vol. broché, 17,5 × 24,5, de XVII, 541 p. — ISBN 0-521-53162-4. — Prix: £ 65.00. — Cambridge University Press, Cambridge, 2003.

Celebrating a century of geometry and geometry teaching, this book will give the reader an enjoyable insight into all things geometrical. There is a wealth of popular articles including sections on Pythagoras, the golden ratio and recreational geometry. Historical items, drawn principally from the *Mathematical Gazette*, are authored by mathematicians such as G.H. Hardy, Rouse Ball, Thomas Heath and Bertrand Russell as well as some more recent expositors. Thirty “Desert Island Theorems” from distinguished mathematicians and educationalists give light to some surprising and beautiful results. Contributors include H.S.M. Coxeter, Michael Atiyah, Tom Apostol, Solomon Golomb, Keith Devlin, Nobel Laureate Leon Lederman, Carlo Séquin, Simon Singh, Christopher Zeeman and Pulitzer Prizewinner Douglas Hofstadter. The book also features the wonderful Eyeball Theorems of Peruvian geometer and web designer, Antonio Gutierrez.

## ***Topologie générale***

Miroslav HUŠEK, Jan VAN MILL, (Editors). — **Recent progress in general topology II.** — Un vol. relié, 17,5 × 24,5, de XII, 638 p. — ISBN 0-444-50980-1. — Prix: € 150.00. — Elsevier, Amsterdam, 2002.

The book presents surveys describing recent developments in most of the primary subfields of general topology and its applications to algebra and analysis during the last decade. It follows freely the previous edition (North-Holland, 1992), *Open Problems in Topology* (North-Holland, 1990) and *Handbook of Set-Theoretic Topology* (North-Holland, 1984). The book was prepared

in connection with the Prague Topological Symposium, held in 2001. During the last 10 years the focus in general topology changed and therefore the selection of topics differs slightly from those chosen in 1992. The following areas experienced significant developments: topological groups, function spaces, dimension theory, hyperspaces, selections, geometric topology (including infinite-dimensional topology and the geometry of Banach spaces). Of course, not every important topic could be included in this book. Except surveys, the book contains several historical essays written by eminent topologists.

### *Topologie algébrique*

Hans-Joachim BAUES. — **The homotopy category of simply connected 4-manifolds.** — London Mathematical Society lecture note series, vol. 297. — Un vol. broché, 15×23, de x, 298 p. — ISBN 0-521-53103-9. — Prix: £24.95. — Cambridge University Press, Cambridge, 2003.

The homotopy type of a closed simply connected 4-manifold is determined by the intersection form. The homotopy classes of maps between two such manifolds, however, do not coincide with the algebraic morphisms between intersection forms. The problem therefore arises of computing the homotopy classes of maps algebraically and determining the law of composition for such maps. This problem is solved in the book by introducing new algebraic models of a 4-manifold.

Jiří MATOUŠEK. — **Using the Borsuk-Ulam theorem: lectures on topological methods in combinatorics and geometry.** — Universitext. — Un vol. broché, 15,5×23,5, de XII, 196 p. — ISBN 3-540-00362-2. — Prix: €39.95. — Springer, Berlin, 2003.

A number of important results in combinatorics, discrete geometry, and theoretical computer science have been proved by surprising applications of algebraic topology. While the results are quite famous, their proofs and the underlying methods are not so widely understood. This textbook explains elementary but powerful topological methods based on the Borsuk-Ulam theorem and its generalizations. It covers many substantial results, sometimes with proofs simpler than those in the original papers. At the same time, it assumes no prior knowledge of algebraic topology, and all the required topological notions and results are gradually introduced. History, additional results, and references are presented in separate sections.

### *Topologie des variétés, analyse globale et analyse des variétés*

Gerhard BURDE, Heiner ZIESCHANG. — **Knots.** — Second revised and extended edition. — De Gruyter studies in mathematics, vol. 5. — Un vol. relié, 18×24,5, de XII, 559 p. — ISBN 3-11-017005-1. — Prix: €69.16. — Walter de Gruyter, Berlin, 2003.

This book is an introduction to classical knot theory. Topics covered include: different constructions of knots, knot diagrams, knot groups, fibred knots, characterisation of torus knots, prime decomposition of knots, cyclic coverings and Alexander polynomials and modules together with the free differential calculus, braids, branched coverings and knots, Montesinos links, representations of knot groups, surgery of 3-manifolds and knots. Knot theory has expanded enormously since the first edition of this book published in 1985. A special feature of the second edition is the introduction to two new constructions of knot invariants, namely the Jones and homfly polynomials. The book contains many figures and some tables of invariants of knots and an extensive bibliography. This comprehensive account is an indispensable reference source for anyone interested in both classical and modern knot theory.

Jorge IZE, Alfonso VIGNOLI. — **Equivariant degree theory.** — De Gruyter series in non-linear analysis and applications, vol. 8. — Un vol. relié,  $18 \times 24,5$ , de XIX, 361 p. — ISBN 3-11-017570-9. — Prix : €98.00. — Walter de Gruyter, Berlin, 2003.

This book presents a new degree theory for maps which commute with a group of symmetries. This degree is no longer a single integer but an element of the group of equivariant homotopy classes of maps between two spheres and depends on the orbit types of the spaces. The authors develop completely the theory and applications of this degree in a self-contained presentation starting with only elementary facts. The first chapter explains the basic tools of representation theory, homotopy theory and differential equations needed in the text. The degree is defined and its main abstract properties are derived. The next part is devoted to the study of equivariant homotopy groups of spheres and to the classification of equivariant maps in the case of Abelian actions. These groups are explicitly computed and the effects of symmetry breaking, products and composition are thoroughly studied. The last part of the book deals with computations of the equivariant index of an isolated orbit and of an isolated loop of stationary points. Here differential equations in a variety of situations are considered. Periodic solutions of Hamiltonian systems, in particular spring-pendulum systems are studied as well as Hopf bifurcation for all these situations.

Colin MACLACHLAN, Alan W. REID. — **The arithmetic of hyperbolic 3-manifolds.** — Graduate texts in mathematics. — Un vol. relié,  $16 \times 24$ , de XIII, 463 p. — ISBN 0-387-98386-4. — Prix : €64.95. — Springer, New York, 2003.

For the past twenty-five years, the Geometrization Program of Thurston has been a driving force for research in 3-manifold topology. This has inspired a surge of activity investigating hyperbolic 3-manifolds (and Kleinian groups), as these manifolds form the largest and least well-understood class of compact 3-manifolds. Familiar and new tools from diverse areas of mathematics have been utilized in these investigations, from topology, geometry, analysis, group theory, and, from the point of view of this book, algebra and number theory. This book is aimed at readers already familiar with the basics of hyperbolic 3-manifolds or Kleinian groups, and it is intended to introduce them to the interesting connections with number theory and the tools that will be required to pursue them. While there are a number of texts that cover the topological, geometric, and analytical aspects of hyperbolic 3-manifolds, this book is unique in that it deals exclusively with the arithmetic aspects, which are not covered in other texts.

Liviu I. NICOLAESCU. — **The Reidemeister torsion of 3-manifolds.** — De Gruyter studies in mathematics, vol. 30. — Un vol. relié,  $17,5 \times 24,5$ , de XIV, 249 p. — ISBN 3-11-017383-2. — Prix : €84.00. — Walter de Gruyter, Berlin, 2003.

This is a state of the art introduction to the work of Franz-Reidemeister, Meng-Taubes, Turaev, and the author on the concept of torsion and its generalizations. Torsion is the oldest topological (but not with respect to homotopy) invariant that in its almost eight decades of existence has been at the centre of many important and surprising discoveries. During the past decade, in the work of Vladimir Turaev, new points of view have emerged, which turned out to be the “right ones” as far as gauge theory is concerned. The book features mostly these new aspects of this venerable concept. Particular emphasis is upon the many and rather diverse concrete examples and techniques which capture the subtleties of the theory better than any abstract general result. Many of these examples and techniques never appeared in print before, and their choice is often justified by ongoing current research on the topology of surface singularities.

## ***Probabilités et processus stochastiques***

I. BERKES, E. CSÁKI, M. CSÓRGÓ, (Editors). — **Limit theorems in probability and statistics.** — 2 vol. reliés, 17×24, de respectivement, 569 p. et 573 p. — ISBN 963-9453-013 (vol. 1 et 2). — János Bolyai Mathematical Society, Budapest, 2002.

The fourth Hungarian Colloquium on Limit Theorems in Probability and Statistics, organized by the János Bolyai Mathematical Society and the Alfréd Rényi Institute of Mathematics of the Hungarian Academy of Sciences, was held in Balatonlelle, Hungary, June 28-July 2, 1999. These volumes reflect the wide ranging and ever growing interest of researchers world-wide in limit theorems in probability and statistics in general, as well as the vigorous presence and impact of the achievements of the Hungarian school of probabilists and statisticians in particular. Most befittingly then in this regard, the meeting in Balatonlelle provided a special opportunity to honour the work of Pál Révész on the occasion of his 65<sup>th</sup> birthday. The present volumes contain papers that were presented at the colloquium. The topics covered include: sums of independent and weakly dependent random variables, invariance principles, large deviations, extreme value theory, empirical and quantile processes, nonparametric statistics, change-point analysis.

François DRESS. — **Probabilités et statistique pour les sciences de la vie.** — 2<sup>e</sup> édition. — Sciences SUP. — DEUG Sciences. — TD: Travaux dirigés. — Un vol. broché, 17×24, de v, 184 p. — ISBN 2-10-006711-7. — Prix: €15.00. — Dunod, Paris, distribué par Vivendi Universal Publishing Services, Fribourg, 2002.

Cet ouvrage s'adresse aux étudiants du premier cycle. Il couvre en 214 questions et exercices les bases des probabilités et de la statistique: Probabilités élémentaires et probabilités conditionnelles, variables aléatoires. — Lois de Bernoulli, binomiale, de Poisson, normale.... — Théorie des épreuves répétées: loi des grands nombres, théorème central limite. — Statistique descriptive, estimation. — Test d'hypothèses: lois de Student, test du khi-deux. — Regression linéaire. Dans cette nouvelle édition sont traitées les bases mathématiques de la transmission des gènes et de la génétique des populations.

Onésimo HERNÁNDEZ-LERMA, Jean Bernard LASSERRE. — **Markov chains and invariant probabilities.** — Un vol. relié, 16×24, de xvi, 205 p. — ISBN 3-7643-7000-3. — Prix: SFr. 88.00. — Birkhäuser, Basel, 2003.

This book concerns discrete-time homogeneous Markov chains that admit an invariant probability measure. The main objective is to give a systematic, self-contained presentation on some key issues about the ergodic behavior of that class of Markov chains. These issues include, in particular, the various types of convergence of expected and pathwise occupation measures, and ergodic decompositions of the state space. Some of the results presented appear for the first time in book form. A distinguishing feature of the book is the emphasis on the role of expected occupation measures to study the long-run behavior of Markov chains on uncountable spaces.

Mark JERRUM. — **Counting, sampling and integrating: algorithms and complexity.** — Lectures in mathematics, ETH Zürich. — Un vol. broché, 17×24, de xi, 112 p. — ISBN 3-7643-6946-9. — Prix: SFr. 38.00. — Birkhäuser, Basel, 2003.

The subject of these notes is counting (of combinatorial structures) and related topics, viewed from a computational perspective. "Related topics" include sampling combinatorial



structures (being computationally equivalent to approximate counting via efficient reductions), evaluating partition functions (being weighted counting), and calculating the volume of bodies (being counting in the limit). A major theme of the book is the idea of accumulating information about a set of combinatorial structures by performing a random walk (i.e., simulating a Markov chain) on those structures. The running time of such an algorithm depends on the rate of convergence to equilibrium of this Markov chain, as formalised in the notion of “mixing time” of the Markov chain. A significant proportion of the volume is given over to an investigation of techniques for bounding the mixing time in cases of computational interest. For the first time this body of knowledge has been brought together in a single volume.

Rolando REBOLLEDO, (Editor). — **Stochastic analysis and mathematical physics II: 4<sup>th</sup> International ANESTOC Workshop in Santiago, Chile.** — Trends in mathematics — Un vol. relié, 17×24, de XI, 162 p. — ISBN 3-7643-6997-0. — Prix: SFr. 98.00. — Birkhäuser, Basel, 2003.

The contributions in this volume highlight emergent research in the area of stochastic analysis and mathematical physics, focussing, in particular, on quantum probability. Key topics covered include novel tools for the qualitative analysis of quantum dynamical semigroups (existence of invariant states, subharmonic projections and faithful normal invariant states, propagation of molecular chaos), and new results on quantum information and quantum large deviations. All articles have been thoroughly refereed and are an outgrowth of the International Workshop in Stochastic Analysis and Mathematical Physics held in Santiago, Chile, in January 2000. The book is addressed to an audience of mathematical physicists, as well as specialists in probability theory, stochastic analysis, and operator algebras.

Bernard YCART. — **Modèles et algorithmes markoviens.** — Mathématiques & applications, vol. 39. — Un vol. broché, 16×24, de XII, 270 p. — ISBN 3-540-43696-0. — Prix: €45.45. — Springer, Paris, 2002.

Ce livre est destiné à tous ceux, mathématiciens ou non, qui souhaitent acquérir une maîtrise pratique de l’outil probabiliste dans ses applications les plus courantes. L’élaboration d’un modèle probabiliste conduit, en dehors de cas particuliers de faible intérêt pratique, à des problèmes théoriques difficiles qui sont vite hors de portée de l’utilisateur (comme d’ailleurs souvent du probabiliste professionnel). La validation d’un tel modèle passe alors nécessairement par la simulation, qui ne met en jeu en général que des procédures extrêmement simples. Apprendre à utiliser les modèles stochastiques, écrire pour eux des programmes de simulation efficaces, prévoir leurs performances et analyser leurs résultats est l’objectif principal de ce livre.

## *Statistique*

Phillip I. GOOD. — **Resampling methods: a practical guide to data analysis.** — Second edition. — Un vol. relié, 16×24, de XII, 238 p. — ISBN 0-8176-4243-9. — Prix: SFr. 158.00. — Birkhäuser, Boston, 2001.

This thoroughly revised second edition is a practical guide to data analysis using the bootstrap, cross-validation, and permutation tests. It is an essential resource for industrial statisticians, statistical consultants, and research professionals in science, engineering, and technology. Only requiring minimal mathematics beyond algebra, it provides a table-free introduction to data analysis utilizing numerous exercises, practical data sets, and freely available statistical software.

## *Analyse numérique*

Olaf STEINBACH. — **Stability estimates for hybrid coupled domain decomposition methods.** — Un vol. broché, 15,5×23,5, de vi, 120 p. — ISBN 3-540-00277-4. — Prix: €22.95. — Springer, Berlin, 2003.

Domain decomposition methods are a well established tool for an efficient numerical solution of partial differential equations, in particular for the coupling of different model equations and of different discretization methods. Based on the approximate solution of local boundary value problems either by finite or boundary element methods, the global problem is reduced to an operator equation on the skeleton of the domain decomposition. Different variational formulations then lead to hybrid domain decomposition methods.

Henk A. VAN DER VORST. — **Iterative Krylov methods for large linear systems.** — Cambridge monographs on applied and computational mathematics. — Un vol. relié, 15,5×23,5, de xiii, 283 p. — ISBN 0-521-81828-1. — Prix: £37.50. — Cambridge University Press, Cambridge, 2003.

Computational simulations of scientific phenomena and engineering problems often depend on solving linear systems with a large number of unknowns. This book gives insight into the construction of iterative methods for the solution of such systems and helps the reader to select the best solver for a given class of problems. The emphasis is on the main ideas and how they have led to efficient solvers such as CG, GMRES, and Bi-CGSTAB. The book also explains the main concepts behind the construction of preconditioners. The reader is encouraged to gain experience by analysing numerous examples that illustrate how best to exploit the methods. The book also hints at many open problems and as such will appeal to established researchers. There are many exercises that motivate the material and help students to understand the essential steps in the analysis and construction of algorithms.

## *Informatique*

André HECK. — **Introduction to Maple.** — Third edition — Un vol. relié, 16×24, de xvi, 828 p. — ISBN 0-387-00230-8. — Prix: €49.95. — Springer, New York, 2003.

This is a fully revised edition of the best-selling *Introduction to Maple*. The book presents the modern computer algebra system Maple, teaching the reader not only what can be done by Maple, but also how and why it can be done. The book also provides the necessary background for those who want the most of Maple or want to extend its built-in knowledge. Emphasis is on understanding the Maple system more than on factual knowledge of built-in possibilities. To this end, the book contains both elementary and more sophisticated examples as well as many exercises. The typical reader should have a background in mathematics at the intermediate level.

Herbert S. WILF. — **Algorithms and complexity.** — Second edition. — Un vol. relié, 16×24, de ix, 219 p. — ISBN 1-56882-178-0. — Prix: US\$39.00. — A.K. Peters, Natick, Massachusetts, 2002.

Updated and back in print, this classic text provides the perfect introduction to the tools of algorithmic design and analysis, concentrating on basic principles and illustrating them with well-chosen paradigm such as: fast Fourier transform, NP-completeness, number theory

and cryptography. Including updated topics for the new edition: the network flow algorithm, a breakthrough result in primality testing. The book contains solutions and hints for most problems.

## *Mécanique des solides, élasticité et plasticité*

Alain MIRANVILLE, Roger TEMAM. — **Modélisation mathématique et mécanique des milieux continus.** — Scopos, vol. 18. — Un vol. broché,  $15,5 \times 23,5$ , de VIII, 280 p. — ISBN 3-540-44035-6. — Prix: € 33.13. — Springer, Berlin, 2003.

Écrit dans un style qui convient aux mathématiciens et à leur formation, cette introduction à la mécanique des milieux continus et à la modélisation mathématique reste néanmoins proche de la physique. En particulier, les auteurs font une distinction claire entre ce qui est admis et ce qui est prouvé. Outre les fondements de la mécanique des milieux continus, cet ouvrage contient des introductions plus ou moins détaillées à diverses disciplines connexes: magnétohydrodynamique, combustion, dynamique des fluides géophysiques,... Les auteurs ont voulu éviter une approche trop abstraite des problèmes traités et garder un langage mathématique élémentaire (les pré-requis sont l'algèbre linéaire et le calcul différentiel et intégral connus de tout étudiant de licence ou de classes préparatoires et de tout ingénieur).

## *Optique, électromagnétique*

Vladislav V. KRAVCHENKO. — **Applied quaternionic analysis.** — Research and exposition in mathematics, vol. 28. — Un vol. broché,  $17 \times 24$ , de 127 p. — ISBN 3-88538-228-8. — Prix: € 24.00. — Heldermann Verlag, Darmstadt, 2003.

Quaternionic analysis is the most natural and close generalization of complex analysis that preserves many of its important features. The present book is meant as an introduction and invitation to this theory and its applications. Restricting ourselves to Maxwell's equations and the Dirac equation only we show the progress achieved in applied quaternionic analysis during the last five years, emphasising results which can not so easily be obtained by other methods. Thus, the main objective of this work is to introduce the reader to some topics of quaternionic analysis whose selection is motivated by particular models from the theory electromagnetic and spinor fields, and to show the usefulness and necessity of applying the tools of quaternionic analysis to these kinds of problems.

## *Economie, recherche opérationnelle, jeux*

Marie BOISSONNADE, Daniel FREDON. — **Mathématiques financières.** — 2<sup>e</sup> édition. — Collection Express. — Un vol. broché,  $15 \times 21$ , de III, 155 p. — ISBN 2-10-006579-3. — Prix: € 12.00. — Dunod, Paris, distribué par Vivendi Universal Publishing Services, Fribourg, 2002.

Comment aller à l'essentiel, comprendre les méthodes et les démarches avant de les mettre en application? Conçue pour faciliter aussi bien l'apprentissage que la révision, la collection «Express» vous propose une présentation simple et concise des mathématiques financières en 22 fiches pédagogiques dont 8 études de cas. Chaque fiche comprend quatre rubriques: concepts généraux (les principes clés), l'essentiel à savoir (notions théoriques fondamentales), compléments (pour aller plus loin), applications (trois ou quatre exercices corrigés). — Sommaire: Notions de base. — Emprunts et investissements. — Études de cas.

J. Frédéric BONNANS, J. Charles GILBERT, Claude LEMARÉCHAL, Claudia A. SAGASTIZÁBAL. — **Numerical optimisation: theoretical and practical aspects.** — Universitex. — Un vol. broché, 15,5×23,5, de XIII, 419 p. — ISBN 3-540-00191-3. — Prix: €44.95. — Springer, Berlin, 2003.

Numerical optimisation has numerous applications in engineering sciences, operations research, economics, finance, etc. Starting with illustrations of this ubiquitous character, this book is essentially devoted to numerical algorithms for optimisation, which are exposed in a tutorial way. It covers fundamental algorithms (conjugate gradient, quasi-Newton, Newton, Gauss-Newton methods, sequential quadratic programming, line-search and trust-region techniques) as well as more specialized and advanced topics for unconstrained and constrained problems (non differentiable optimisation, interior-point methods for linear programming and linear monotone complementarity problems). The theoretical bases of the subject, such as optimality conditions, Lagrange multipliers or duality, although recalled, are assumed known. Most of the algorithms described in the book are explained in a detailed manner, allowing straightforward implementation. This level of detail is intended to familiarize the reader with some of the crucial questions of numerical optimisation: how algorithms operate, why they converge, difficulties that may be encountered and their possible remedies. Theoretical aspects of the approaches chosen (including their motivation, conditions for convergence, speed of convergence) are also addressed with care, often using minimal assumptions.

Richard J. NOWAKOWSKI, (Editor). — **More games of no chance.** — Mathematical Sciences Research Institute publications, vol. 42. — Un vol. relié, 16×24, de XII, 535 p. — ISBN 0-521-80832-4. — Prix: £ 40.00. — Cambridge University Press, Cambridge, 2003.

This book is a state-of-the-art look at combinatorial games, that is, games not involving chance or hidden information. It contains articles by some of the foremost researchers and pioneers of combinatorial game theory, such as Elwyn Berlekamp and John Conway, by other researchers in mathematics and computer science, and by top game players. The articles run the gamut from new theoretical approaches (infinite games, generalizations of game values, two-player cellular automata, alpha-beta pruning under partial orders) to the very latest in some of the hottest games (amazons, chomp, dot-and-boxes, go, chess, hex). Many of these advances reflect the interplay of the computer science and the mathematics. The book ends with an updated bibliography by A. Fraenkel and an updated version of the famous annotated list of combinatorial game theory problems by R. K. Guy, now in collaboration with R. J. Nowakowski.

## *Systemes, contrôle optimal*

Agamirza E. BASHIROV. — **Partially observable linear systems under dependent noises.** — Systems & control: foundations & applications. — Un vol. relié, 16×24, de XXVI, 334 p. — ISBN 3-7643-6999-X. — Prix: SFr. 138.00. — Birkhäuser, Basel, 2003.

This book discusses the methods of fighting against noise. It can be regarded as a mathematical view of specific engineering problems with known and new methods of control and estimation in noisy media. The main feature of this book is the investigation of stochastic optimal control and estimation problems with the noise processes acting dependently on the state (or signal) and observation systems. The discussion is given for infinite dimensional systems, but within the linear quadratic framework for continuous and finite time horizon. In order to make this book self-contained, some background material is provided. The book may also be used as a reference manual in that part of functional analysis that is needed for problems of infinite dimensional linear systems theory.