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Généralités

M.A. AL-GWAIZ and S.A. ELSANOUSI. — **Elements of real analysis.** — Pure and applied mathematics, vol. 284. — Un vol. relié, 16×24, de XIII, 436 p. — ISBN 1-58488-661-7. — Prix: US$89.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2006.

Focusing on one of the main pillars of mathematics, *Elements of Real Analysis* provides a comprehensive introduction to analysis on the real line. The book prepares you for conducting analysis in higher dimensions and more abstract spaces by building up the analytical skills and structures needed for handling the basic notions of limits and continuity in a simple concrete setting. Largely self-contained, the book begins with the fundamental axioms of the real number system and gradually develops the core of real analysis. The first few chapters present the essentials needed for analysis, including the concepts of sets, relations, and functions. The following chapters cover the theory of calculus on the real line, addressing theorems like mean value, inverse function, Taylor's, and Weierstrass approximation. The final chapters focus on the more advanced theory of Lebesgue measure and integration.

Claudi ALSINA, Roger B. NELSEN. — **Math made visual: creating images for understanding mathematics.** — Classroom resource materials. — Un vol. relié, 18,5×26,5, de XV, 173 p. — ISBN 0-88385-746-4. — Prix: £30.00. — Mathematical Association of America, Washington, DC, distributed by Cambridge University Press, Cambridge, 2006.

Is it possible to make mathematical drawings that help to understand mathematical ideas, proofs and arguments? The authors of this book are convinced that the answer is yes and the objective of this book is to show how some visualization techniques may be employed to produce pictures that have both mathematical and pedagogical interest. Mathematical drawings related to proofs have been produced since antiquity in China, Arabia, Greece and India, but only in the last thirty years has there been a growing interest in so-called "proofs without words". Hundreds of these have been published in *Mathematics Magazine* and *The College Mathematics Journal*, as well as in other journals, books and on the World Wide Web. Oftentimes, a person encountering a "proof without words" may have the feeling that the pictures involved are the result of a serendipitous discovery or the consequence of exceptional ingenuity on the part of the picture's creator. In this book the authors show that behind most of the pictures "proving"

mathematical relations are some well-understood methods. As the reader shall see, a given mathematical idea or relation may have many different images that justify it, so that depending on the teaching level or the objectives for producing the pictures, one can choose the best alternative.

Béla Bollobás. — **The art of mathematics: coffee time in Memphis.** — Un vol. broché, 15×23, de XV, 359 p. — ISBN 0-521-69395-0 (relié: 0-521-87228-6). — Prix: £19.99 (relié: £45.00). — Cambridge University Press, Cambridge, 2006.

Can a Christian escape from a lion? How quickly can a rumour spread? Can you fool an airline into accepting oversize baggage? Recreational mathematics is full of frivolous questions in which the mathematician's art can be brought to bear. But play often has a purpose, whether it's bear cubs in mock fights, or war games. In mathematics, it can sharpen skills, or provide amusement, or simply surprise, and collections of problems have been the stock-in-trade of mathematicians for centuries. Two of the twentieth century's greatest players of problem posing and solving, Erdős and Littlewood, are the inspiration for this collection, which is designed to be sipped from, rather than consumed in one sitting. The questions themselves range in difficulty: the most challenging offer a glimpse of deep results that engage mathematicians today; even the easiest are capable of prompting readers to think about mathematics. All come with solutions, many with hints, and most with illustrations. Whether you are an expert, or a beginner, or an amateur, this book will delight for a lifetime.

David Alexander Brannan. — **A first course in mathematical analysis.** — Un vol. broché, 19×24,5, de XII, 459 p. — ISBN 0-521-68424-2 (relié: 0-521-86439-9). — Prix: £24.99 (relié: £50.00). — Cambridge University Press, Cambridge, 2006.

Mathematical analysis is generally found by students to be one of their hardest courses in mathematics. This text uses the so-called sequential approach to continuity, differentiability and integration to make it easier to understand the subject. Topics that are generally glossed over in the standard calculus courses are given careful study here. For example, what exactly is a "continuous" function? And how exactly can one give a careful definition of "integral"? This latter is often one of the mysterious points in a calculus course – and it is quite tricky to give a rigorous treatment of integration! The text has a large number of diagrams and helpful margin notes and uses many graded examples and exercises, often with complete solutions, to guide students through the tricky points. It is suitable for self-study or for use in parallel with a standard university course on the subject.

Robert Carlson. — **A concrete introduction to real analysis.** — Pure and applied mathematics. — Un vol. relié, 16×23,5, de 296 p. — ISBN 1-58488-654-4. — Prix: US$89.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2006.

Avoiding unnecessary abstractions to provide an accessible presentation of the material, *A Concrete Introduction to Real Analysis* supplies the crucial transition from a calculations-focused treatment of mathematics to a proof-centered approach. Providing a substantial rethinking of the presentation of real analysis as well as drawing from the history of mathematics and practical applications, this volume uses problems emerging from calculus to introduce themes of estimation, approximation, and convergence. Beginning with standard calculus techniques and ending with the formal treatment of logic, real numbers, and functions, the book covers discrete calculus, selected area computations, Taylor's theorem, infinite sequences and series, limits, continuity and differentiability of functions, the Riemann integral, and much more. It contains a large collection of examples and exercises, ranging from simple problems that allow students to check their understanding of the concepts to challenging problems that develop new material.

Sudhir R. Ghorpade, Balmohan V. Limaye. — **A course in calculus and real analysis.** — Undergraduate texts in mathematics. — Un vol. relié, 16×24, de x, 432 p. — ISBN 0-387-30530-0. — Prix: €46.95. — Springer, New York, 2006.

This book provides a self-contained and rigorous introduction to calculus of functions of one variable. The presentation and sequencing of topics emphasizes the structural development of calculus. At the same time, due importance is given to computational techniques and applications. The authors have strived to make a distinction between the intrinsic definition of a geometric notion and its analytic characterization. Throughout the book, the authors highlight the fact that calculus provides a firm foundation to several concepts and results that are generally encountered in high school and accepted on faith. For example, one can find here a proof of the classical result that the ratio of the circumference of a circle to its diameter is the same for all circles. Also, this book helps students get a clear understanding of the concept of an angle and the definitions of the logarithmic, exponential, and trigonometric functions, together with a proof of the fact that these are not algebraic functions. A number of topics that may have been inadequately covered in calculus courses and glossed over in real analysis courses are treated here in considerable detail. As such, this book provides a unified exposition of calculus and real analysis.

Leon Harkleroad. — **The math behind the music.** — Un vol. broché, 15,5×23, de xiv, 143 p. — ISBN 0-521-00935-9 (relié: 0-521-81095-7). — Prix: £14.99 (relié: £40.00). — Cambridge University Press, Cambridge, 2006.

Mathematics has been used for centuries to describe, analyze, and create music. In this book, Leon Harkleroad explores the math-related aspects of music from its acoustical bases to compositional techniques to music criticism, touching on: — overtones, scales, and tuning systems — the musical dice games attributed to Mozart and Haydn — the several-hundred-year-old style of bell-playing known as ringing the changes — the twelve-tone school of composition that strongly influenced music throughout the twentieth century, and many other topics involving mathematical ideas from probability theory to Fourier series to group theory. He also relates some cautionary tales of misguided attempts to mix music and mathematics. Both the mathematical and the musical concepts are described in an elementary way, making the book accessible to general readers as well as to mathematicians and musicians of all levels. The book is accompanied by an audio CD of musical examples.

Robert Messer, Philip Straffin. — **Topology now!** — Classroom resource materials. — Un vol. relié, 18,5×26,5, de xi, 240 p. — ISBN 0-88385-744-8. — Prix: £30.00. — Mathematical Association of America, Washington, DC, distributed by Cambridge University Press, Cambridge, 2006.

Topology is a branch of mathematics packed with intriguing concepts, fascinating geometrical objects and ingenious methods for studying them. The authors have written this textbook to make this material accessible to undergraduate students without requiring extensive prerequisites in upper-level mathematics. The approach is to cultivate the intuitive ideas of continuity, convergence, and connectedness so students can quickly delve into knot theory, the topology of surfaces and three-dimensional manifolds, fixed points, and elementary homotopy theory. The fundamental concepts of point-set topology appear at the end of the book when students can see how this level of abstraction provides a sound logical basis for the geometrical ideas that have come before. This organization exposes students to the exciting geometrical ideas of topology now (!) rather than later. Students using this textbook should have some exposure to the geometry of objects in higher-dimensional Euclidean spaces together with an appreciation of precise mathematical definitions and proofs. Multivariable calculus, linear algebra, and one further proof-oriented mathematics course are suitable preparation.

Patrice TAUVEL. — **Algèbre: Agrégation, Licence 3e année, Master.** — Deuxième édition. — Sciences sup: Mathématiques. — Un vol. broché, 17×24, de X, 422 p. — ISBN 2-10-049412-0. — Prix: €37.00 — Dunod, Paris, 2005.

Cet ouvrage traite l'ensemble du programme d'algèbre du concours de l'Agrégation de mathématiques. Il reprend, dans les premiers chapitres, les résultats d'algèbre enseignés dans les classes préparatoires ou en licence. Il peut donc être également utilisé par les étudiants de Master. Dans les 25 chapitres de ce livre, sont traités: l'algèbre générale, la théorie des groupes, l'algèbre linéaire, l'arithmétique dans les anneaux, et l'algèbre multilinéaire. Afin d'être autonome, ce cours intègre également des chapitres traitant de questions d'analyse et de topologie. Les résultats sont tous accompagnés de leur démonstration, sauf pour quelques points de la théorie des ensembles, faisant de cet ouvrage un outil de travail efficace pour la préparation au concours.

Histoire

Steve BATTERSON. —**Pursuit of genius: Flexner, Einstein, and the early faculty at the Institute for Advanced Study.** — Un vol. relié, 16×24, de XI, 301 p. — ISBN 1-56881-259-0. — Prix: US$39.00. — A.K. Peters, Wellesley, Massachusetts, 2006.

The Institute for Advanced Study occupies a unique position among institutions of higher learning. An account of its early years is long overdue, so the appearance of the present volume, during the 75th anniversary of the Institute's founding, is most welcome. Batterson has mined the Institute's archives to provide a detailed and unvarnished account of the backstage conflicts and intrigue that attended the Institute's growth and determined its future. Those unfamiliar with the Institute will learn how one man's vision shaped a couple's philanthropy and created a haven for scholars in the midst of the Great Depression. Equally, those who have had the privilege of Institute membership will enhance their appreciation of the intellectual leaders who made their own Institute experiences possible.

José FERREIRÓS, Jeremy J. GRAY, (Editors). — **The architecture of modern mathematics: essays in history and philosophy.** — Un vol. relié, 16,5×24, de XII, 442 p. — ISBN 0-19-856793-6. — Prix: £39.95. — Oxford University Press, Oxford, 2006.

This volume, aimed at both students and researchers in philosophy, mathematics and history of science, highlights leading developments in the overlapping areas of philosophy and the history of modern mathematics. It is a coherent, wide ranging account of how a number of topics in the philosophy of mathematics must be reconsidered in the light of the latest historical research, and how a number of historical accounts can be deepened by embracing philosophical questions.

Yvette KOSMANN-SCHWARZBACH. — **Les théorèmes de Noether: invariance et lois de conservation au XXe siècle: avec une traduction de l'article original, «Invariante Variationsprobleme».** — Avec la collaboration de Laurent MEERSSEMAN. — Deuxième édition. — Histoire des mathématiques. — Un vol. broché, 17×24, de 201 p. — ISBN 2-7302-1138-1. — Prix: €24.00. — Les Éditions de l'École polytechnique, Palaiseau, 2006.

Cet ouvrage retrace les péripéties de la conception et de la diffusion d'un texte fondamental. Il s'adresse à tous ceux qui s'intéressent aux mathématiques et à la physique, ainsi qu'à leur histoire. Une traduction et un commentaire historique et scientifique: nouvelle édition contenant

une traduction révisée et un commentaire revu et augmenté. Texte fondamental établissant le lien entre symétries et lois de conservation des problèmes variationnels, l'article d'Emmy Noether, « Invariante Variationsprobleme » fut publié en 1918. D'une portée restée longtemps méconnue, il eut une influence considérable sur la physique moderne, après une saga d'oublis et de redécouvertes. Ce livre contient la première traduction de ce texte d'allemand en français. Il contient aussi un commentaire approfondi, avec plus de trois cents références : les origines du problème, l'atmosphère scientifique à Göttingen lors des débuts de la Relativité Générale, la réception du travail de Noether par Klein, Hilbert, Weyl et Pauli, la curieuse fortune tant du premier que du second théorème, ainsi qu'un précis en termes modernes de l'article, et un chapitre sur ses prolongements mathématiques récents.

John STILLWELL. — **Yearning for the impossible : the surprising truths of mathematics.** — Un vol. relié, 16×24, de XIII, 230 p. — ISBN 1-56881-254-X. — Prix : US$29.95. — A.K. Peters, Wellesley, Massachusetts, 2006.

Our history is full of great accomplishments that arose from confronting a challenge that was generally considered impossible: circumnavigating the globe, scaling Mount Everest, even landing on the Moon. The same is true of the history of mathematics. This book explores that history through a lens focused on the creative tension between common sense and the "impossible" as the author follows the discovery and invention of new concepts that have marked mathematical progress, including: irrational and imaginary numbers, the fourth dimension, curved space, infinity, and more. Drawing connections to art, literature, philosophy, and physics, this book examines the place of mathematics in our intellectual landscape.

Logique et fondements

Zoé CHATZIDAKIS, Peter KOEPKE, Wolfram POHLERS, (Editors). — **Logic colloquium '02: proceedings of the Annual European Summer Meeting of the Association for Symbolic Logic and the Colloquium Logicum, held in Münster, Germany, August 3-11, 2002.** — Lecture notes in logic, vol. 27. — Un vol. broché, 15,5×22,5, de XVIII, 359 p. — ISBN 1-56881-301-5. — Prix : US$40.00. — Association for Symbolic Logic, San Diego, A.K. Peters, Wellesley, Massachussets, 2006.

This book is a compilation of papers presented at the 2002 European Summer Meeting of the Association for Symbolic Logic and the associated Colloquium Logicum 2002 conference. It includes tutorials and research articles from some of the world's preeminent logicians. Topics presented span all areas of mathematical logic, with particular emphasis on computability theory and proof theory.

Ali ENAYAT, Iraj KALANTARI, Mojtaba MONIRI, (Editors). — **Logic in Tehran : proceedings of the Workshop and Conference on Logic, Algebra and Arithmetic, held October 18-22, 2003.** — Lecture notes in logic, vol. 26. — Un vol. broché, 15,5×22,5, de XVI, 341 p. — ISBN 1-56881-296-5. — Prix : US$40.00. — Association for Symbolic Logic, San Diego, A.K. Peters, Wellesley, Massachussets, 2006.

This book is a collection of papers based on a conference that was held in Tehran, Iran, with the express purpose of bringing together researchers with connections to Iranian logicians and promoting further research in mathematical logic in Iran. Particular emphasis was given to model theory and its applications to algebra and formal theories of arithmetic. Other papers address category theory, computability, modal logic, and the history of mathematical logic in Iran.

Analyse combinatoire

Richard A. BRUALDI. — **Combinatorial matrix classes.** — Encyclopedia of mathematics and its applications, vol. 108. — Un vol. relié, 16 × 24, de X, 544 p. — ISBN 0-521-86565-4. — Prix : £ 60.00. — Cambridge University Press, Cambridge, 2006.

A natural sequel to the author's previous book *Combinatorial Matrix Theory* written with H.J. Ryser, this is the first book devoted exclusively to existence questions, constructive algorithms, enumeration questions, and other properties concerning classes of matrices of combinatorial significance. Several classes of matrices are thoroughly developed including the classes of matrices of 0s and 1s with a specified number of 1s in each row and column (equivalently, bipartite graphs with a specified degree sequence), symmetric matrices in such classes (equivalently, graphs with a specified degree sequence), tournament matrices with a specified number of 1s in each row (equivalently, tournaments with a specified score sequence), nonnegative matrices with specified row and column sums, and doubly stochastic matrices. Most of this material is presented for the first time in book format and the chapter on doubly stochastic matrices provides the most complete development of the topic to date.

Théorie des nombres

Dorian GOLDFELD. — **Automorphic forms and *L*-functions for the group GL(*n*, R).** — With an appendix by Kevin A. BROUGHAN. — Cambridge studies in advanced mathematics, vol. 99. — Un vol. relié, 15,5 × 23,5, de XIII, 493 p. — ISBN 0-521-83771-5. — Prix : £ 48.00. — Cambridge University Press, Cambridge, 2006.

L-functions associated with automorphic forms encode all classical number theoretic information. They are akin to elementary particles in physics. This book provides an entirely self-contained introduction to the theory of *L*-functions in a style accessible to graduate students with a basic knowledge of classical analysis, complex variable theory, and algebra. Also within the volume are many new results not yet found in the literature. The exposition provides complete detailed proofs of results in an easy-to-read format using many examples and without the need to know and remember many complex definitions. The main themes of the book are first worked out with GL(2, **R**) and GL(3, **R**), and then for the general case of GL(*n*, **R**). In an appendix to the book, a set of *Mathematica*® functions is presented, designed to allow the reader to explore the theory from a computational point of view.

Hugh L. MONTGOMERY, Robert C. VAUGHAN. — **Multiplicative number theory : I. Classical theory.** — Cambridge studies in advanced mathematics, vol. 97. — Un vol. relié, 15,5 × 23,5, de XVII, 552 p. — ISBN 0-521-84903-9. — Prix : £ 48.00. — Cambridge University Press, Cambridge, 2007.

Prime numbers are the multiplicative building blocks of natural numbers. Understanding their overall influence, and especially their distribution, gives rise to central questions in mathematics and physics ; in particular, their finer distribution is connected closely with the Riemann hypothesis, the most important unsolved problem in the mathematical world. Assuming only subjects covered in a standard degree in mathematics, the authors comprehensively cover all the topics met in first courses on multiplicative number theory and on the distribution of prime numbers. They bring their extensive and distinguished research expertise to bear in preparing the

student for intelligent reading of the more advanced research literature. The text, which is based on courses taught successfully over many years at Michigan, Imperial College and Penn State, is enriched by comprehensive historical notes and references as well as over 500 exercises.

Jorge L. RAMIREZ ALFONSIN. — **The Diophantine Frobenius problem.** — Oxford lecture series in mathematics and its applications, vol. 30. — Un vol. relié, 16×24, de XVI, 243 p. — ISBN 0-19-856820-7. — Prix: £55.00. — Oxford University Press, Oxford, 2005.

During the early part of the last century, Ferdinand Georg Frobenius (1849-1917) raised the following problem, known as the Diophantine Frobenius problem: given relatively prime positive integers $a_1,...,a_n$, find the largest natural number, called the Frobenius number, that is not representable as a non-negative integer combination of $a_1,...,a_n$. At first glance the Diophantine Frobenius problem may look deceptively specialized. Nevertheless it crops up again and again in the most unexpected places and has been extremely useful in investigating many different problems. A number of methods, from several areas of mathematics, have been used in the hope of finding a formula giving the Frobenius number and algorithms to calculate it. The main intention of this book is to highlight such methods, ideas, viewpoints and applications for as wide an audience as possible.

R. SIVARAMAKRISHNAN. — **Certain number-theoretic episodes in algebra.** — Pure and applied mathematics, vol. 286. — Un vol. relié, 16×24, de 632 p. — ISBN 0-8247-5895-1. — Prix: US$139.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2006.

Many basic ideas of algebra and number theory intertwine, making it ideal to explore both at the same time. *Certain Number-Theoretic Episodes in Algebra* focuses on some important aspects of interconnections between number theory and commutative algebra. Using a pedagogical approach, the author presents the conceptual foundations of commutative algebra arising from number theory. Self-contained, the book examines situations where explicit algebraic analogues of theorems of number theory are available. Coverage is divided into four parts, beginning with elements of number theory and algebra such as theorems of Euler, Fermat, and Lagrange, Euclidean domains, and finite groups. In the second part, the book details ordered fields, fields with valuation, and other algebraic structures. This is followed by a review of fundamentals of algebraic number theory in the third part. The final part explores links with ring theory, finite dimensional algebras, and the Goldbach problem.

Terence TAO, Van H. VU. — **Additive combinatorics.** — Cambridge studies in advanced mathematics, vol. 105. — Un vol. relié, 16×23,5, de XVIII, 512 p. — ISBN 0-521-85386-9. — Prix: £45.00. — Cambridge University Press, Cambridge, 2006.

Additive combinatorics is the theory of counting additive structures in sets. While this theory has been developing for many decades, the field has seen exciting advances and dramatic changes in direction in recent years thanks to its connections with other areas of mathematics, such as number theory, ergodic theory and graph theory. This graduate-level textbook will quickly allow students and researchers easy entry into this fascinating field. Here, for the first time, the authors bring together in a self-contained and systematic manner the many different tools and ideas that are used in the modern theory, presenting them in an accessible, coherent, and intuitively clear way, and providing immediate applications to problems in additive combinatorics. The power of these tools is well demonstrated in the presentation of recent advances such as the Green-Tao theorem on arithmetic progressions, Erdős distance problems, and the newly developing field of sum-product estimates. The text is supplemented by a large number of exercises and other material which has not previously appeared elsewhere.

Corps et polynômes

Alexandra SHLAPENTOKH. — **Hilbert's tenth problem: Diophantine classes and extensions to global fields.** — New mathematical monographs, vol. 7. — Un vol. relié, 15,5×23,5, de XIII, 320 p. — ISBN 0-521-83360-4. — Prix: £55.00. — Cambridge University Press, Cambridge, 2007.

In the late 1960s Matiyasevich, building on the work of Davis, Putnam, and Robinson, showed that there was no algorithm to determine whether a polynomial equation in several variables and with integer coefficients has integer solutions. Hilbert gave finding such an algorithm as problem number ten on a list he presented at an international congress of mathematicians in 1900. Thus the problem, which has become known as Hilbert's Tenth Problem, was shown to be unsolvable. This book presents an account of results extending Hilbert's Tenth Problem to integrally closed subrings of global fields including, in the function field case, the fields themselves. While written from the point of view of algebraic number theory, the book includes chapters on Mazur's conjectures on topology of rational points and Poonen's elliptic curve method for constructing a Diophantine model of rational integers over a "very large" subring of the field of rational numbers.

Anneaux et algèbres

Josette CALAIS. — **Éléments de théorie des anneaux: anneaux commutatifs. Niveau L3.** — Mathématiques à l'université: Cours et exercices corrigés. — Un vol. broché, 17,5×26, de XII, 252 p. — ISBN 2-7298-2779-X. — Prix: €26.00. — Ellipses, Paris, 2006.

Ce livre, d'abord destiné aux étudiants de licence et de maîtrise de mathématiques, contient l'essentiel des connaissances de base de la théorie des anneaux commutatifs. Chaque chapitre est suivi d'exercices ou de problèmes qui mettent en relief les principaux résultats du cours ou les complètent. Les volumes de cette collection comportent un exposé du cours avec des démonstrations détaillées de tous les résultats essentiels et de nombreux exercices.

John DAUNS, Yiqiang ZHOU. — **Classes of modules.** — Pure and applied mathematics. — Un vol. relié, 16×24, de X, 218 p. — ISBN 1-58488-660-9. — Prix: US$89.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2006.

By working with natural classes and type submodules (TS), *Classes of Modules* demonstrates the importance of the next generation of ring and module theory. It shows how to achieve positive results by placing restrictive hypotheses on only a small subset of the complement submodules, i.e., the TS. Furthermore, it explains why direct sum decompositions of various kinds exist. Carefully developing the foundations of the subject, the authors begin by providing background on the terminology and introducing the different module classes. The module classes consist of torsion, torsion-free, $\sigma[M]$, natural, and prenatural. They expand the discussion by exploring advanced theorems and new classes, such as new chain conditions, TS-module theory, lattices, and prenatural classes of right R-modules. The book finishes with a study of the lattice of prenatural classes and its Boolean sublattice of natural classes.

Philippe GILLE, Tamás SZAMUELY. — **Central simple algebras and Galois cohomology.** — Cambridge studies in advanced mathematics, vol. 101. — Un vol. relié, 15,5×23,5, de IX, 343 p. — ISBN 0-521-86103-9. — Prix: £45.00. — Cambridge University Press, Cambridge, 2006.

This book is the first comprehensive, modern introduction to the theory of central simple algebras over arbitrary fields. Starting from the basics, it reaches such advanced results as the Merkurjev-Suslin theorem. This theorem is both the culmination of work initiated by Brauer, Noether, Hasse and Albert in the 1930s and the starting point of motivic cohomology theory, a domain at the forefront of current research in algebraic geometry and K-theory and the setting of recent spectacular work by Voevodsky, Suslin, Rost and others. Assuming only a solid background in algebra, but no homological algebra, the book covers the basic theory of central simple algebras, methods of Galois descent and Galois cohomology, Severi-Brauer varieties, residue maps and, finally, Milnor K-theory and K-cohomology. A number of noteworthy additional topics are also covered. The last chapter rounds off the theory by presenting the results in positive characteristic, including the theorem of Bloch-Gabber-Kato. The book is suitable as a textbook for graduate students and as a reference for researchers working in algebra, algebraic geometry or K-theory.

Rüdiger GÖBEL, Jan TRLIFAJ. — **Approximations and endomorphism algebras of modules.** — De Gruyter expositions in mathematics, vol. 41. — Un vol. relié, 17,5×24,5, de XXIV, 640 p. — ISBN 3-11-011079-2. — Prix: SFr. 205.00. — Walter de Gruyter, Berlin, 2006.

Realization theorems have become important indicators of the non-classification theory of modules. In order to overcome this problem, approximation theory of modules has been developed over the past few decades. The idea here is to select suitable subcategories C whose modules can be classified, and then to approximate arbitrary modules by ones from C. These approximations are neither unique nor functional in general, but there is always a rich supply available appropriate to the requirements of various particular applications. Thus approximation theory has developed into an important part of the classification theory of modules. In this monograph the two methods are brought together. First the approximation theory of modules is developed and some of its recent applications, notably to infinite dimensional tilting theory, are presented. Then some prediction principles from set theory are introduced and these become the principal tools in the establishment of appropriate realization theorems. The monograph starts from basic facts and gradually develops the theory towards its present frontiers. It is suitable both for graduate students interested in algebra and for experts in module and representation theory.

Dietlinde LAU. — **Function algebras on finite sets: a basic course on many-valued logic and clone theory.** — Springer monographs in mathematics. — Un vol. relié, 16×24, de XIV, 668 p. — ISBN 3-540-36022-0. — Prix: €96.25. — Springer, Berlin, 2006.

Functions, which are defined on finite sets, occur in almost all fields of mathematics. For more than 80 years algebras whose universe are such functions (so-called function algebras), have been intensively studied. This book gives a broad introduction to the theory of function algebras and leads to the cutting edge of research. To familiarize the reader from the very beginning on with the algebraic side of function algebras the more general concepts of the universal algebra is given in the first part of the book. The second part on function algebras covers the following topics: Galois-connection between function algebras and relation algebras, completeness criterions, clone theory. This book is an indispensable source on function algebras for graduate students and researchers in mathematical logic and theoretical computer science.

Catégories, algèbre homologique, cohomologie des groupes

Giandomenico BOFFI, David BUCHSBAUM. — **Threading homology through algebra: selected patterns.** — Oxford Mathematical Monographs. — Un vol. relié, 16×24, de XI, 255 p. — ISBN 0-19-852499-4. — Prix: £ 60.00. — Oxford University Press, Oxford, 2006.

Threading Homology Through Algebra takes homological themes (Koszul complexes and their variations, resolutions in general) and shows how these affect the perception of certain problems in selected parts of algebra, as well as their success in solving a number of them. The text deals with regular local rings, depth-sensitive complexes, finite free resolutions, letter-place algebra, Schur and Weyl modules, Weyl-Schur complexes and determinantal ideals. Aimed at graduates and academics in mathematics, the book provides an overview of the developments that have taken place in these areas as well as an insight into some of the open problems which exist.

K-théorie

Aderemi KUKU. — **Representation theory and higher algebraic K-theory.** — Pure and applied mathematics, vol. 287. — Un vol. relié, 16×24, de XXV, 442 p. — ISBN 1-58488-603-X. — Prix: US$99.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2006.

This book is the first to present higher algebraic K-theory of orders and group rings as well as characterize higher algebraic K-theory as Mackey functors that lead to equivariant higher algebraic K-theory and their relative generalizations. Thus, this book makes computations of higher K-theory of group rings more accessible and provides novel techniques for the computations of higher K-theory of finite and some infinite groups. The book begins with a careful review of classical K-theory, including clear definitions, examples, and important classical results. Emphasizing the practical value of the usually abstract topological constructions, the author systematically discusses higher algebraic K-theory of orders and group rings and proves numerous results. He also discusses in depth profinite higher K- and G-theory of exact categories, orders, and group rings. Providing new insights into classical results and opening avenues for further applications, the book uses representation-theoretic techniques to examine equivariant higher algebraic K-theory, their relative generalizations, and equivariant homology theories for discrete group actions. The final chapter unifies Farrell-Jones and Baum-Connes isomorphism conjectures through Davis-Lück assembly maps.

Théorie des groupes et généralisations

Adolfo BALLESTER-BOLINCHES, Luis M. EZQUERRO. — **Classes of finite groups.** — Mathematics and its applications, vol. 584. — Un vol. relié, 17×25, de XI, 385 p. — ISBN 1-4020-4718-5. — Prix: € 159.95. — Springer, Dordrecht, 2006.

Many group theorists all over the world have been trying in the last twenty-five years to extend and adapt the magnificent methods of the theory of finite soluble groups to the more ambitious universe of all finite groups. This is a natural progression after the classification of finite simple groups but the achievements in this area are scattered in various papers. Our objectives in this book were to gather, order and examine all this material, including the latest advances made, give a new approach to some classic topics, shed light on some fundamental

facts that still remain unpublished and to present some new subjects of research in the theory of classes of finite, not necessarily solvable, groups.

Gerhard O. MICHLER. — **Theory of finite simple groups.** — New mathematical monographs, vol. 8. — Un vol. relié, $15,5 \times 23,5$, de IX, 662 p. — ISBN 0-521-86625-1. — Prix: £80.00. — Cambridge University Press, Cambridge, 2006.

This book provides the first representation theoretic and algorithmic approach to the theory of abstract finite simple groups. Together with the cyclic groups of prime order, the finite simple groups are the building blocks of all finite groups. The theory presented here is built on the intimate relations between general group theory, ordinary character theory, modular representation theory, and algorithmic algebra. Each of these theories is developed in this book from scratch. The author then applies these theories to present proofs of classical and new group order formulas, and a new structure theorem for abstract finite simple groups. This, and the famous Brauer-Fowler theorem, provide the theoretical background for the author's algorithm, which constructs all finite simple groups G having a 2-central involution z with a given centralizer $C_G(z) = H$ as matrix groups over finite fields. It also determines their conjugacy classes and character tables. The theory and algorithms have concrete applications, and the author demonstrates this by constructing all the simple satellites of the known simple groups that are not uniquely determined by a given centralizer H. Uniform existence and uniqueness proofs are given for the modern sporadic simple groups discovered by Janko, Higman and Sims, Harada, and Thompson. This latter result due to Weller, Previtali and the author proves a longstanding open problem in the theory of finite simple groups. The experimental results are documented in the accompanying DVD produced by M. Weller. These applications show that the methods developed in this book can be used efficiently to calculate matrix representations, permutation representations, and character tables of large groups.

Groupes topologiques; groupes et algèbres de Lie

Karl H. HOFMANN, Sidney A. MORRIS. — **The structure of compact groups: a primer for the student – a handbook for the expert.** — Second revised and augmented edition. — De Gruyter studies in mathematics, vol. 25. — Un vol. relié, $18,5 \times 24,5$, de XVII, 858 p. — ISBN 3-11-019006-0. — Prix: €119.63. — Walter de Gruyter, Berlin, 2006.

Dealing with subject matter of compact groups that is frequently cited in fields like algebra, topology, functional analysis, and theoretical physics, this book has been conceived with the dual purpose of providing a text book for upper level graduate courses and seminars, and of serving as a source book for research specialists who need to apply the structure and representation theory of compact groups. After a gentle introduction to compact groups and their representation theory, the book presents self-contained courses on linear Lie groups, on compact Lie groups, and on locally compact Abelian groups. However, the thrust of the book points in the direction of the structure theory of infinite dimensional, not necessarily commutative compact groups, unfettered by weight restrictions or dimensional bounds. In the process it utilizes infinite dimensional Lie algebras and the exponential function of arbitrary compact groups. For the present new edition the text has been edited and improved in various sections. New material has been added in order to reflect ongoing research. The integrity of the original section numbering was carefully respected so that citations of material from the first edition remain perfectly viable to the users of this edition.

Fonctions d'une variable complexe

Jürgen JOST. — **Compact Riemann surfaces: an introduction to contemporary mathematics.** — Third edition. — Universitext. — Un vol. broché, 15,5×23,5, de XVIII, 277 p. — ISBN 3-540-33065-8. — Prix: €48.10. — Springer, Berlin, 2006.

Although Riemann surfaces are a time-honoured field, this book is novel in its broad perspective that systematically explores the connection with other fields of mathematics. It can serve as an introduction to contemporary mathematics as a whole as it develops background material from algebraic topology, differential geometry, the calculus of variations, elliptic PDE, and algebraic geometry. It is unique among textbooks on Riemann surfaces in including an introduction to Teichmüller theory. The analytic approach is likewise new as it is based on the theory of harmonic maps. For this new edition, the author has expanded and rewritten several sections to include additional material and to improve the presentation.

Fonctions spéciales

J.V. ARMITAGE, W.F. EBERLEIN. — **Elliptic functions.** — London Mathematical Society student texts, vol. 67. — Un vol. broché, 15×22,5, de XIII, 387 p. — ISBN 0-521-78563-4 (relié: 0-521-78078-0). — Prix: £24.95 (relié: £50.00). — Cambridge University Press, Cambridge, 2006.

In the first six chapters this text seeks to present the basic ideas and properties of the Jacobi elliptic functions as a historical essay in an attempt to answer the fascinating question: "what would the treatment of elliptic functions have been like if Abel had developed the ideas, rather than Jacobi?". Accordingly, it is based on the idea of inverting integrals that arise in the theory of differential equations and, in particular, the differential equation that describes the motion of a simple pendulum. The later chapters present a more conventional approach to the Weierstrass functions and to elliptic integrals, and then the reader is introduced to the richly varied applications of the elliptic and related functions. Applications spanning arithmetic (solution of the general quintic, the functional equation of the Riemann zeta function), dynamics (orbits, Euler's equations, Green's functions), and also probability and statistics, are discussed.

Équations différentielles ordinaires

Peter J. COLLINS. — **Differential and integral equations.** — Mathematics. — Un vol. broché, 19×24,5, de XII, 372 p. — ISBN 0-19-853382-9. — Prix: £27.50. — Oxford University Press, Oxford, 2006.

Differential and integral equations involve important mathematical techniques and as such will be encountered by mathematicians and physical and social scientists in their undergraduate courses. This text provides a guide to first- and second-order ordinary and partial differential equations whilst introducing important and useful basic material on integral equations. Readers will encounter detailed discussion of the wave, heat and Laplace equations, of Green's functions and their application to the Sturm-Liouville equation, and how to use series solutions, transform methods and phase-plane analysis. The calculus of variations will take them further into the world of applied analysis. Providing a wealth of techniques, but yet satisfying the needs of the pure mathematician, and with numerous carefully worked examples and exercises, the text is ideal for any undergraduate with basic calculus to gain thorough grounding in "analysis for applications".

Randall J. Swift, Stephen A. Wirkus. — **A course in ordinary differential equations.** — Un vol. relié, 16×24, de 667 p. — ISBN 1-58488-476-2. — Prix : US$ 89.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2007.

The first contemporary textbook on ordinary differential equations (ODEs) to include instructions on Matlab®, Mathematica®, and Maple™, *A Course in Ordinary Differential Equations* focuses on applications and methods of analytical and numerical solutions, emphasizing approaches used in the typical engineering, physics, or mathematics student's field of study. Stressing applications wherever possible, the authors have written this text with the applied math, engineer, or science major in mind. It includes a number of modern topics that are not commonly found in a traditional sophomore-level text. For example, Chapter 2 covers direction fields, phase line techniques, and the Runge-Kutta method; another chapter discusses linear algebraic topics, such as transformations and eigenvalues. Chapter 6 considers linear and nonlinear systems of equations from a dynamical systems viewpoint and uses the linear algebra insights from the previous chapter; it also includes modern applications like epidemiological models. With sufficient problems at the end of each chapter, even the pure math major will be fully challenged.

Équations aux dérivées partielles

Philip G. Drazin, Norman Riley. — **The Navier-Stokes equations: a classification of flows and exact solutions.** — London Mathematical Society lecture note series, vol. 334. — Un vol. broché, 15×23, de x, 196 p. — ISBN 0-521-68162-6. — Prix : £27.99. — Cambridge University Press, Cambridge, 2006.

The Navier-Stokes equations were firmly established in the nineteenth century as the system of non-linear partial differential equations that describe the motion of most commonly occurring fluids in air and water, and since that time exact solutions have been sought by scientists. Collectively, these solutions allow a clear insight into the behaviour of fluids, providing a vehicle for novel mathematical methods and a useful check for computations in fluid dynamics, a field in which theoretical research is now dominated by computational methods. This book draws together exact solutions from widely differing sources and presents them in a coherent manner, in part by classifying solutions via their temporal and geometric constraints. It will prove to be a valuable resource to all who have an interest in the subject of fluid mechanics, and in particular to those who are learning or teaching the subject at senior undergraduate and graduate levels.

Friedrich Sauvigny. — **Partial differential equations 1: Foundations and integral representations, with consideration of lectures by E. Heinz.** — Universitext. — Un vol. broché, 15,5×23,5, de xiv, 437 p. — ISBN 3-540-34457-8. — Prix : €42.75. — Springer, Berlin, 2006.

This comprehensive two-volume textbook presents the whole area of partial differential equations – of the elliptic, parabolic, and hyperbolic type – in two and several variables. Special emphasis is put on the connection of PDEs and complex variable methods. In this first volume the following topics are treated: integration and differentiation on manifolds, functional analytic foundations, Brouwer's degree of mapping, generalized analytic functions, potential theory and spherical harmonics, linear partial differential equations. While we solve the partial differential equations via integral representations in this volume, we shall present functional analytic solution methods in the second volume. This textbook can be chosen for a course over several semesters on a medium level. Advanced readers may study each chapter independently from the others.

Friedrich SAUVIGNY. — **Partial differential equations 2: Functional analytic methods, with consideration of lectures by E. Heinz.** — Universitext. — Un vol. broché, 15,5×23,5, de XIV, 388 p. — ISBN 3-540-34461-6. — Prix : €42.75. — Springer, Berlin, 2006.

In this volume the following topics are treated: solvability of operator equations in Banach spaces, linear operators in Hilbert spaces and spectral theory, Schauder's theory of linear elliptic differential equations, weak solutions of differential equations, nonlinear partial differential equations and characteristics, nonlinear elliptic systems with differential-geometric applications. While partial differential equations are solved via integral representations in the preceding volume, functional analytic solution methods are used in this volume. This textbook can be chosen for a course over several semesters on a medium level. Advanced readers may study each chapter independently from the others.

Systèmes dynamiques et théorie ergodique

Rob STURMAN, Julio M. OTTINO, Stephen WIGGINS. — **The mathematical foundations of mixing: the linked twist map as a paradigm in applications: micro to macro, fluids to solids.** — Cambridge monographs on applied and computational mathematics, vol. 22. — Un vol. relié, 15,5×23,5, de XX, 281 p. — ISBN 0-521-86813-0. — Prix: £40.00. — Cambridge University Press, Cambridge, 2006.

Mixing processes occur in a variety of technological and natural applications, with length and time scales ranging from the very small – as in microfluidic applications – to the very large – for example, mixing the Earth's oceans and atmosphere. The diversity of problems can give rise to a diversity of approaches. Are there concepts that are central to all of them? Are there tools that allow for prediction and quantification? The authors show how a range of flows in very different settings – micro to macro, fluids to solids – possess the characteristic of *streamline crossing*, a central kinematic feature of "good mixing". This notion can be placed on a firm mathematical footing via linked twist maps (LTMs), which are the central organizing principle of this book. The authors discuss the definition and construction of LTMs, provide examples of specific systems that can be analysed in the LTM framework and introduce a number of mathematical techniques – non-uniform hyperbolicity and smooth ergodic theory – which are then brought to bear on the problem of fluid mixing. In a final chapter, they argue that the analysis of linked twist maps opens the door to a plethora of new investigations, both from the point of view of basic mathematics as well as new applications, and present a number of open problems and new directions. Consequently, this book will be of interest to a broad spectrum of readers, from pure and applied mathematicians to engineers, physicists and geophysicists.

Suites, séries, sommabilité

Daniel D. BONAR, Michael J. KHOURY, Jr. — **Real infinite series.** — Classroom resource materials. — Un vol. relié, 18×26,5, de XII, 264 p. — ISBN 0-88385-745-6. — Prix: £30.00. — Mathematical Association of America, Washington, DC, distributed by Cambridge University Press, Cambridge, 2006.

This is an introductory treatment of infinite series of real numbers, bringing the reader from basic definitions and tests to advanced results. An up-to-date presentation is given, making infinite series accessible, interesting, and useful to a wide audience, including students, teachers, and researchers. In its most basic setting, infinite series is the vehicle mathematicians use to extend finite addition to "infinite addition". *Real Infinite Series* presents elementary and

advanced tests for convergence or divergence, information about the harmonic series, the alternating harmonic series, and closely related series. One chapter offers 107 concise, crisp, surprising results about infinite series. Recognizing the interest in problem solving that abounds with students of mathematics, the authors devote a chapter to problems on infinite series, and solutions, which have appeared on the annual William Lowell Putnam Mathematical Competition. The lighter side of infinite series is treated in the concluding chapter where three puzzles, eighteen visuals (what Martin Gardner calls *"look-see"* diagrams), and several fallacious proofs are made available. Three appendices provide a listing of true or false statements, answers to why the harmonic series is so named, and an extensive list of published works devoted entirely or partially to infinite series.

Transformations intégrales, calcul opérationnel

Lokenath DEBNATH, Dambaru BHATTA. — **Integral transforms and their applications.** — Second edition. — Un vol. relié, 16×24, de 700 p. — ISBN 1-58488-575-0. — Prix: US$79.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2006.

Keeping the style, content, and focus that made the first edition a bestseller, *Integral Transforms and Their Applications, Second Edition* stresses the development of analytical skills rather than the importance of more abstract formulation. The authors provide a working knowledge of the analytical methods required in pure and applied mathematics, physics, and engineering. The second edition includes many new applications, exercises, comments, and observations with some sections entirely rewritten. It contains more than 500 worked examples and exercises with answers as well as hints to selected exercises. — *The most significant changes in the second edition include:* New chapters on fractional calculus and its applications to ordinary and partial differential equations, wavelets and wavelet transformations, and Radon transform. — Revised chapter on Fourier transforms, including new sections on Fourier transforms of generalized functions. Poisson's summation formula, Gibbs' phenomenon, and Heisenberg's uncertainty principle. — A wide variety of applications has been selected from areas of ordinary and partial differential equations, integral equations, fluid mechanics and elasticity, mathematical statistics, fractional ordinary and partial differential equations, and special functions. — A broad spectrum of exercises at the end of each chapter further develops analytical skills in the theory and applications of transform methods and a deeper insight into the subject.

H.-J. GLAESKE, A.P. PRUDNIKOV, K.A. SKÒRNIK. — **Operational calculus and related topics.** — Analytical methods and special functions, vol. 10. — Un vol. relié, 18×26, de XVI, 403 p. — ISBN 1-58488-649-8. — Prix: US$89.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2006.

Even though the theories of operational calculus and integral transforms are centuries old, these topics are constantly developing, due to their use in the fields of mathematics, physics, and electrical and radio engineering. *Operational Calculus and Related Topics* highlights both the classical methods and applications as well as the recent advances in the field. This volume provides an introduction to the backbones of pure and applied mathematics. The text examines both the analytical and algebraic aspects of operational calculus and includes a comprehensive survey of classical results while stressing new developments in the field. Among the historical methods considered are Oliver Heaviside's algebraic operational calculus and Paul Dirac's delta function. Other discussions deal with the conditions for the existence of integral transforms, Jan Mikusiński's theory of convolution quotients, operator functions, and the sequential approach to

the theory of generalized functions. Because *Operational Calculus and Related Topics* provides examples illustrating the applications to various disciplines, it serves as an ideal reference for mathematicians, physicists, scientists, engineers, and students.

Analyse fonctionnelle

Fernando ALBIAC, Nigel J. KALTON. — **Topics in Banach space theory.** — Graduate texts in mathematics, vol. 233. — Un vol. relié, 16×24,5, de XI, 373 p. — ISBN 0-387-28141-X. — Prix : €56.95. — Springer, New York, 2006.

Assuming only a basic knowledge of functional analysis, the book gives the reader a self-contained overview of the ideas and techniques in the development of modern Banach space theory. Special emphasis is placed on the study of classical Lebesgue spaces L_p (and their sequence space analogues) and spaces of continuous functions. The authors also stress the use of bases and basic sequences techniques as a tool for understanding the isomorphic structure of Banach spaces. The aim of this text is to provide the reader with the necessary technical tools and background to reach the frontiers of research without the introduction of too many extraneous concepts. Detailed and accessible proofs are included, as are a variety of exercises and problems.

Suren A. GRIGORYAN, Thomas V. TONEV. — **Shift-invariant uniform algebras on groups.** — Monografie Matematyczne, vol. 68. — Un vol. relié, 17×24, de IX, 284 p. — ISBN 3-7643-7606-6. — Prix : SFr. 128.00. — Birkhäuser, Basel, 2006.

The central subject of the book - the theory of shift-invariant algebras - is an outgrowth of the established theory of generalized analytic functions. Associated subalgebras of almost periodic functions of real variables and of bounded analytic functions on the unit disc are carried along within the general framework. In particular, it is shown that the algebra of almost periodic functions with spectrum in a semigroup of the reals does not have a half-plane-corona if and only if all non-negative semicharacters of the semigroup are monotone decreasing, or equivalently, if and only if the strong hull of the semigroup coincides with the positive half of its group envelope. Under the same conditions the corresponding subalgebra of bounded analytic functions on the disc has neither a half-plane-corona nor a disc-corona. There are given characterizations of semigroups such that classical theorems of complex analysis hold on the associated shift-invariant algebras. Bourgain algebras, orthogonal measures, and primary ideals of big disc algebras are described. The notion of a harmonic function is extended on compact Abelian groups, and corresponding Fatou-type theorems are proven. Important classes of inductive limits of standard uniform algebras, including Blaschke algebras, are introduced and studied. In particular, it is shown that algebras of hyper-analytic functions, associated with families of inner functions, do not have a big-disc-corona.

Dzung Minh HA. — **Functional analysis, vol. 1 : a gentle introduction.** — Un vol. relié, 16×24, de XVI, 640 p. — ISBN 0-9715766-1-0. — Prix : US$65.00. — Matrix Editions, Ithaca, N.Y., 2006.

This book is designed as an introduction to basic functional analysis at the senior/graduate level. It has been written in such a way that a well-motivated undergraduate student can follow and appreciate the material without undue difficulties while advanced graduate student can also find topics of interest: topological vector spaces, Kolmogorov's normability criterion, Tychonov's classification of finite-dimensional Hausdorff topological vector spaces, and the theorems of Korovkin and Muntz, to mention a few. — *Contents*: Three important inequalities.

— Metric and topological spaces. — Normed spaces. — Inner product spaces. — The Banach space $C(X)$. — Additional topics. — Appendices: Set theory and functions. Mostly linear algebra: a brief review. Some technical results. Solutions to odd exercises.

Dorothee D. HAROSKE. — **Envelopes and sharp embeddings of function spaces.** — Chapman & Hall/CRC research notes in mathematics, vol. 437. — Un vol. relié, 16×24, de X, 227 p. — ISBN 1-58488-750-8. — Prix: US$89.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2007.

Until now, no book has systematically presented the recently developed concept of envelopes in function spaces. Envelopes are relatively simple tools for the study of classical and more complicated spaces, such as Besov and Triebel-Lizorkin types, in limiting situations. This theory originates from the classical result of the Sobolev embedding theorem, ubiquitous in all areas of functional analysis. Self-contained and accessible, *Envelopes and Sharp Embeddings of Function Spaces* provides the first detailed account of the new theory of growth and continuity envelopes in function spaces. The book is well structured into two parts, first providing a comprehensive introduction and then examining more advanced topics. Some of the classical function spaces discussed in the first part include Lebesgue, Lorentz, Lipschitz, and Sobolev. The author defines growth and continuity envelopes and examines their properties. In part II, the book explores the results for function spaces of Besov and Triebel-Lizorkin types. The author then presents several applications of the results, including Hardy-type inequalities, asymptotic estimates for entropy, and approximation numbers of compact embeddings.

Alexandru NICA, Roland SPEICHER. — **Lectures on the combinatorics of free probability.** — London Mathematical Society lecture note series, vol. 335. — Un vol. broché, 15,5×23, de XV, 417 p. — ISBN 0-521-85852-6. — Prix: £45.00. — Cambridge University Press, Cambridge, 2006.

Free probability theory studies a special class of "noncommutative" random variables, which appears in the context of operators on Hilbert spaces and in the context of large random matrices. Since its emergence in the 1980s, free probability has evolved into an established field of mathematics with strong connections to other mathematical areas, such as operator algebras, classical probability theory, random matrices, combinatorics, and representation theory of symmetric groups. Free probability also connects to more applied scientific fields, such as wireless communication in electrical engineering. This book is the first to give a self-contained and comprehensive introduction to free probability theory that has its main focus on the combinatorial aspects. The volume is designed so that it can be used as a textbook for an introductory course (at an advanced undergraduate or beginning graduate level), and is also well suited for the individual study of free probability.

Joseph C. VÁRILLY. — **An introduction to noncommutative geometry.** — EMS series of lectures in mathematics.— Un vol. broché, 17×24, de VIII, 113 p. — ISBN 978-3-03719-024-1. — Prix: €28.00. — European Mathematical Society, Zürich, 2006.

Noncommutative geometry, inspired by quantum physics, describes singular spaces by their noncommutative coordinate algebras, and metric structures by Dirac-like operators. Such metric geometries are described mathematically by Connes' theory of spectral triples. These lectures, delivered at an EMS Summer School on noncommutative geometry and its applications, provide an overview of spectral triples based on examples. This introduction is aimed at graduate students of both mathematics and theoretical physics. It deals with Dirac operators on spin manifolds, noncommutative tori, Moyal quantization and tangent groupoids, action functionals, and isospectral deformations. The structural framework is the concept of a noncommutative spin

geometry; the conditions on spectral triples which determine this concept are developed in detail. The emphasis throughout is on gaining understanding by computing the details of specific examples. The book provides a middle ground between a comprehensive text and a narrowly focused research monograph. It is intended for self-study, enabling the reader to gain access to the essentials of noncommutative geometry. New features since the original course are an expanded bibliography and a survey of more recent examples and applications of spectral triples.

Théorie des opérateurs

Klaus-Jochen ENGEL, Rainer NAGEL. — **A short course on operator semigroups.** — Universitext. — Un vol. relié, 16×24, de X, 247 p. — ISBN 0-387-31341-9. — Prix: €46.95. — Springer, New York, 2006.

The book gives a streamlined and systematic introduction to strongly continuous semigroups of bounded linear operators on Banach spaces. It treats the fundamental Hille-Yosida generation theorem as well as perturbation and approximation theorems for generators and semigroups. The special feature is its treatment of spectral theory leading to a detailed qualitative theory for these semigroups. This theory provides a very efficient tool for the study of linear evolution equations arising as partial differential equations, functional differential equations, stochastic differential equations, and others. Therefore, the book is intended for those wanting to learn and apply functional analytic methods to linear time dependent problems arising in theoretical and numerical analysis, stochastics, physics, biology, and other sciences. It should be of interest to graduate students and researchers in these fields.

Maurice DE GOSSON. — **Symplectic geometry and quantum mechanics.** — Operator theory: advances and applications, vol. 166. — Advances in partial differential equations, vol. 166. — Un vol. relié, 17×24, de XX, 367 p. — ISBN 3-7643-7574-1. — Prix: SFr. 218.00. — Birkhäuser, Basel, 2006.

This book is devoted to a rather complete discussion of techniques and topics intervening in the mathematical treatment of quantum and semi-classical mechanics. It starts with a rigorous presentation of the basics of sympletic geometry and of its multiply-oriented extension. Further chapters concentrate on Lagrangian manifolds, Weyl operators and the Wigner-Moyal transform as well as on metaplectic groups and Maslov indices. Thus the keys for the mathematical description of quantum mechanics in phase space are discussed. They are followed by a rigorous geometrical treatment of the uncertainty principle. Then Hilbert-Schmidt and trace-class operators are exposed in order to treat density matrices. In the last chapter the Weyl pseudo-differential calculus is extended in order to derive a Schrödinger equation in phase space whose solutions are related to those of the usual Schrödinger equation by a wave-packet transform.

Luca LORENZI, Marcello BERTOLDI. — **Analytical methods for Markov semigroups.** — Pure and applied mathematics, vol. 283. — Un vol. relié, 16×23,5, de XXXI, 526 p. — ISBN 1-58488-659-5. — Prix: US$99.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2006.

For the first time in book form, *Analytical Methods for Markov Semigroups* provides a comprehensive analysis on Markov semigroups both in spaces of bounded and continuous functions as well as in L^p spaces relevant to the invariant measure of the semigroup. Exploring specific techniques and results, the book collects and updates the literature associated with Markov semigroups. Divided into four parts, the book begins with the general properties of the semigroup in spaces of continuous functions: the existence of solutions to the elliptic and to the parabolic equation, uniqueness properties and counterexamples to uniqueness, and the definition

and properties of the weak generator. It also examines properties of the Markov process and the connection with the uniqueness of the solutions. In the second part, the authors consider the replacement of $\mathbf{R}^N$ with an open and unbounded domain of $\mathbf{R}^N$. They also discuss homogeneous Dirichlet and Neumann boundary conditions associated with the operator A. The final chapters analyze degenerate elliptic operators A and offer solutions to the problem.

Géométrie

Rey CASSE. — **Projective geometry: an introduction.** — Mathematics. — Un vol. broché, 15,5×23,5, de XII, 198 p. — ISBN 0-19-929886-6. — Prix: £25.95. — Oxford University Press, Oxford, 2006.

This text provides an introductory guide to projective geometry, an area of mathematics concerned with the properties and invariants of geometric figures under projection. Including numerous worked examples and exercises throughout, the book covers axiomatic geometry, field planes and PG(r, F), coordinatising a projective plane, non-Desarguesian planes, conics and quadrics in PG(3, F). Assuming familiarity with linear algebra, elementary group theory, partial differentiation and finite fields, as well as some elementary coordinate geometry, this text is ideal for 3rd and 4th year mathematics undergraduates.

Patrice TAUVEL. — **Géométrie: Agrégation, Licence 3e année, Master.** — Deuxième édition. — Sciences sup: Mathématiques. — Un vol. broché, 17×24 cm, de IX, 532 p. — ISBN 2-10-049413-9. — Prix: €40.00. — Dunod, Paris, 2005.

Cet ouvrage traite l'ensemble du programme de géométrie au concours de l'Agrégation de mathématiques. Il reprend certains sujets enseignés en Licence et Master et ne suppose aucune connaissance préalable en géométrie. Il peut donc être également utilisé par les étudiants de ces cursus. Dans les 32 chapitres de ce livre sont traités: les réseaux, les angles, les espaces affines, la géométrie euclidienne, les coniques, les polyèdres, les espaces projectifs, les courbes et les surfaces. Afin d'être autonome, ce cours intègre également un chapitre traitant de calcul différentiel. Les résultats sont tous accompagnés de leur démonstration, faisant de cet ouvrage un outil de travail efficace pour la préparation au concours de l'Agrégation.

Ensembles convexes et inégalités géométriques

Richard J. GARDNER. — **Geometric tomography.** — Second edition. — Encyclopedia of mathematics and its applications, vol. 58. — Un vol. broché, 15,5×23,5, de XXI, 492 p. — ISBN 0-521-68493-5 (relié: 0-521-86680-4). — Prix: £40.00 (relié: £80.00). — Cambridge University Press, Cambridge, 2006.

Geometric tomography deals with the retrieval of information about a geometric object from data concerning its projections (shadows) on planes or cross-sections by planes. It is a geometric relative of computerized tomography, which reconstructs an image from X-rays of a human patient. The subject overlaps with convex geometry and employs many tools from that area, including some formulas from integral geometry. It also has connections to discrete tomography, geometric probing in robotics, and stereology. This comprehensive study provides a rigorous treatment of the subject. Although primarily meant for researchers and graduate students in geometry and tomography, brief introductions, suitable for advanced undergraduates, are provided to the basic concepts. More than 70 illustrations are used to clarify the text. The book also presents 66 unsolved problems. Each chapter ends with extensive notes, historical remarks,

and some biographies. This new edition includes numerous updates and improvements, with some 50 extra pages of material and 300 new references, bringing the total to more than 800.

Géométrie différentielle

Isaac CHAVEL. — **Riemannian geometry: a modern introduction.** — Second edition. — Cambridge studies in advanced mathematics, vol. 98. — Un vol. broché, 15 × 23, de XVI, 471 p. — ISBN 0-521-61954-8 (relié: 0-521-85368-0). — Prix: £24.99 (relié: £55.00). — Cambridge University Press, Cambridge, 2006.

This book provides an introduction to Riemannian geometry, the geometry of curved spaces, for use in a graduate course. Requiring only an understanding of differentiable manifolds, the book covers the introductory ideas of Riemannian geometry, followed by a selection of more specialized topics. Also featured are notes and exercises for each chapter to develop and enrich the reader's appreciation of the subject. This second edition has a clearer treatment of many topics from the first edition, with new proofs of some theorems. A new chapter on the Riemannian geometry of surfaces has been added.

Sorin DRAGOMIR, Giuseppe TOMASSINI. — **Differential geometry and analysis on CR manifolds.** — Progress in Mathematics, vol. 246. — Un vol. relié, 16 × 24, de XIV, 487 p. — ISBN 0-8176-4388-5. — Prix: SFr. 142.00. — Birkhäuser, Boston, 2006.

The study of CR manifolds lies at the intersection of three main mathematical disciplines: partial differential equations, complex analysis in several complex variables, and differential geometry. While the PDE and complex analytic aspects have been intensively studied in the last fifty years, much effort has recently been made to understand the differential geometric side of the subject. This monograph provides a unified presentation of several differential geometric aspects in the theory of CR manifolds and tangential Cauchy-Riemann equations. It presents the major differential geometric achievements in the theory of CR manifolds, such as the Tanaka-Webster connection, Fefferman's metric, pseudo-Einstein structures and the Lee conjecture, CR immersions, subelliptic harmonic maps as a local manifestation of pseudoharmonic maps from a CR manifold, Yang-Mills fields on CR manifolds, to name a few. It also aims at explaining how certain results from analysis are employed in CR geometry. Motivated by clear exposition, many examples, explicitly worked-out geometric results, and stimulating unproved statements and comments referring to the most recent aspects of the theory, this monograph is suitable for researchers and graduate students in differential geometry, complex analysis, and PDEs.

Anders KOCK. — **Synthetic differential geometry.** — Second edition. — London Mathematical Society lecture note series, vol. 333. — Un vol. broché, 15 × 23, de XII, 233 p. — ISBN 0-521-68738-1. — Prix: £29.99. — Cambridge University Press, Cambridge, 2006.

Synthetic Differential Geometry is a method of reasoning in differential geometry and differential calculus, based on the assumption of sufficiently many nilpotent elements on the number line, in particular numbers d such that $d^2 = 0$. The use of nilpotent elements allows one to replace the limit processes of calculus by algebraic calculations and notions. For the first half of the book, familiarity with differential calculus and abstract algebra is presupposed during the development of results in calculus and differential geometry on a purely axiomatic/synthetic basis. In the second half, basic notions of category theory are presumed in the construction of suitable Cartesian closed categories and in the interpretation of logical formulae within them. This is a second edition of Kock's classical text from 1981. Many notes have been included, with

comments on developments in the field from the intermediate years, and almost 100 new bibliographic entries have been added.

Topologie algébrique

Sergey V. MATVEEV. — **Lectures on algebraic topology.** — EMS series of lectures in mathematics. — Un vol. broché, 17×24, de 99 p. — ISBN 3-03719-023-X. — Prix: €28.00. — European Mathematical Society, Zürich, 2006.

Algebraic topology is the study of the global properties of spaces by means of algebra. It is an important branch of modern mathematics with a wide degree of applicability to other fields, including geometric topology, differential geometry, functional analysis, differential equations, algebraic geometry, number theory, and theoretical physics. This book provides an introduction to the basic concepts and methods of algebraic topology for the beginner. It presents elements of both homology theory and homotopy theory, and includes various applications. The author's intention is to rely on the geometric approach by appealing to the reader's own intuition to help understanding. The numerous illustrations in the text also serve this purpose. Two features make the text different from the standard literature: first, special attention is given to providing explicit algorithms for calculating the homology groups and for manipulating the fundamental groups. Second, the book contains many exercises, all of which are supplied with hints or solutions. This makes the book suitable for both classroom use and for independent study.

Topologie des variétés, analyse globale et analyse des variétés

John Hamal HUBBARD. — **Teichmüller theory and applications to geometry, topology, and dynamics: vol. 1, Teichmüller theory.** — With contributions by Adrien DOUADY, William DUNBAR, Roland ROEDER, Sylvain BONNOT, David BROWN, Allen HATCHER, Chris HRUSKA, Sudeb MITRA. — Un vol. relié, 16×24, de XX, 459 p. — ISBN 0-9715766-2-9. — Prix: US$69.00. — Matrix Editions, Ithaca, N.Y., 2006.

This book is self-contained, with thorough treatments of the uniformization theorem, the geometry of hyperbolic surfaces, and the properties of quasiconformal mappings that are needed for its development of Teichmüller theory. The book also has much to offer to readers who are already familiar with advanced complex analysis and Teichmüller spaces. There is novelty even in the discussions of the uniformization theorem and the geometry of quasiconformal mappings. No other book proves both Royden's theorem about automorphisms of Teichmüller spaces and Slodkowski's theorem about holomorphic motions. The book is divided into two volumes. The first sets up the Teichmüller theory necessary for discussing Thurston's theorems; the second proves Thurston's theorems providing more background material where necessary, in particular for the two hyperbolization theorems.

Yair MINSKY, Makoto SAKUMA, Caroline SERIES, (Editors). — **Spaces of Kleinian groups.** — London Mathematical Society lecture note series, vol. 329. — Un vol. broché, 15×23, de VII, 390 p. — ISBN 0-521-61797-9. — Prix: £40.00. — Cambridge University Press, Cambridge, 2006.

The subject of Kleinian groups and hyperbolic 3-manifolds is currently undergoing explosively fast development, the last few years having seen the resolution of many long-standing conjectures. This volume contains important expositions and original work by some of the main contributors on topics such as topology and geometry of 3-manifolds, curve

complexes, classical Ahlfors-Bers theory, computer explorations and projective structures. This volume is the proceedings of the programme *Spaces of Kleinian Groups and Hyperbolic 3-Manifolds* held at the Isaac Newton Institute in Cambridge, 21 July-15 August 2003. It is a companion volume to *Kleinian Groups and Hyperbolic 3-Manifolds*, London Mathematical Society lecture notes 299, the proceedings of a conference with the same title held at the Mathematics Institute, University of Warwick, 11-15 September 2001.

Probabilités et processus stochastiques

Jean BERTOIN. — **Random fragmentation and coagulation processes.** — Cambridge studies in advanced mathematics, vol. 102. — Un vol. relié, 15,5×23,5, de VII, 280 p. — ISBN 0-521-86728-2. — Prix : £ 35.00. — Cambridge University Press, Cambridge, 2006.

The fragmentation and coalescent processes considered in this text describe the evolution of particle systems, where particles are characterized by their sizes. The book starts by developing the theory of fragmentation chains, that is processes in which each fragment remains stable for some random time and then splits; it then turns to the general situation where each fragment may split instantaneously, using Kingman's theory of exchangeable random partitions. Then, two quite different types of coagulation process are considered: "exchangeable" coalescents where rates of coagulation do not depend on the masses in the system and coagulations may occur simultaneously and involve an arbitrary number of components, and "stochastic" coalescents, where only binary coagulations are permitted and the rate of such coagulation may depend on the two fragments involved. This self-contained treatment develops the models in a way that make recent advances in the field accessible to readers with a solid background in probability. Each chapter ends with a comments section in which important aspects not discussed in the main part of the text (often because the discussion would have been too technical and/or lengthy) are addressed and precise references are given.

Mihaï BRANCOVAN, Thierry JEULIN. — **Probabilités. Niveau M1.** — Mathématiques à l'université : Cours et exercices corrigés. — Un vol. broché, 17,5×26, de X, 436 p. — ISBN 2-7298-2778-1. — Prix : € 39.00. — Ellipses, Paris, 2006.

Ce livre a pour ambition d'offrir un panorama aussi complet et autonome que possible des bases de la théorie des probabilités, depuis la théorie de la mesure et l'intégration jusqu'à la convergence en loi, en passant par les fonctions caractéristiques, les variables gaussiennes et plusieurs formulations de la loi des grands nombres. Il s'adresse principalement à l'étudiant de Master et au candidat à l'Agrégation, mais pourra aussi intéresser le jeune chercheur. Aucune connaissance préalable en probabilités n'est nécessaire à sa compréhension ; le lecteur est cependant censé bien maîtriser les programmes d'algèbre et d'analyse des deux premières années d'université. De nombreux (201) exercices viennent illustrer ou prolonger le cours par des exemples, des contre-exemples ou des résultats complémentaires, issus, pour certains, d'articles de recherche. Pour chaque exercice, un corrigé détaillé et rigoureux est donné en fin de volume.

Giuseppe DA PRATO. — **An introduction to infinite-dimensional analysis.** — Universitext. — Un vol. broché, 15,5×23,5, de X, 208 p. — ISBN 3-540-29020-6. — Prix : € 44.95. — Springer, Berlin, 2006.

In this revised and extended version of his course notes from a 1-year course at Scuola Normale Superiore, Pisa, the author provides an introduction – for an audience knowing basic functional analysis and measure theory but not necessarily probability theory – to analysis in a separable Hilbert space of infinite dimension. Starting from the definition of Gaussian

measures in Hilbert spaces, concepts such as the Cameron-Martin formula, Brownian motion and Wiener integral are introduced in a simple way. These concepts are then used to illustrate some basic stochastic dynamical systems (including dissipative nonlinearities) and Markov semi-groups, paying special attention to their long-time behaviour: ergodicity, invariant measure. Here fundamental results like the theorems of Prokhorov, von Neumann, Krylov-Bogoliubov and Khas'minski are proved. The last chapter is devoted to gradient systems and their asymptotic behaviour.

Andreas E. KYPRIANOU. — **Introductory lectures on fluctuations of Lévy processes with applications.** — Universitext. — Un vol. broché, 15,5 × 23,5, de XIII, 373 p. — ISBN 3-540-31342-7. — Prix: €42.75. — Springer, Berlin, 2006.

Lévy processes are the natural continuous-time analogue of random walks and form a rich class of stochastic processes around which a robust mathematical theory exists. Their mathematical significance is justified by their application in many areas of classical and modern stochastic models including storage models, renewal processes, insurance risk models, optimal stopping problems, mathematical finance and continuous-state branching processes. This text book forms the basis of a graduate course on the theory and applications of Lévy processes, from the perspective of their path fluctuations. Central to the presentation are decompositions of the paths of Lévy processes in terms of their local maxima and an understanding of their short- and long-term behaviour. The book aims to be mathematically rigorous while still providing an intuitive feel for underlying principles. The results and applications often focus on the case of Lévy processes with jumps in only one direction, for which recent theoretical advances have yielded a higher degree of mathematical transparency and explicitness. Each chapter has a comprehensive set of exercises with complete solutions.

Michael B. MARCUS, Jay ROSEN. — **Markov processes, Gaussian processes, and local times.** — Cambridge studies in advanced mathematics, vol. 100. — Un vol. relié, 16 × 23,5, de X, 620 p. — ISBN 0-521-86300-7. — Prix: £50.00. — Cambridge University Press, Cambridge, 2006.

Written by two of the foremost researchers in the field, this book studies the local times of Markov processes by employing isomorphism theorems that relate them to certain associated Gaussian processes. It builds to this material through self-contained but harmonized "mini-courses" on the relevant ingredients, which assume only knowledge of measure-theoretic probability. The streamlined selection of topics creates an easy entrance for students and experts in related fields. The book starts by developing the fundamentals of Markov process theory and then of Gaussian process theory, including sample path properties. It then proceeds to more advanced results, bringing the reader to the heart of contemporary research. It presents the remarkable isomorphism theorems of Dynkin and Eisenbaum and then shows how they can be applied to obtain new properties of Markov processes by using well-established techniques in Gaussian process theory. This original, readable book will appeal to both researchers and advanced graduate students.

Statistique

D.R. COX. — **Principles of statistical inference.** — Un vol. broché, 15,5 × 23, de XV, 219 p. — ISBN 0-521-68567-2. — Prix: £19.99. — Cambridge University Press, Cambridge, 2006.

In this important book, D.R. Cox develops the key concepts of the theory of statistical inference, in particular describing and comparing the main ideas and controversies over

foundational issues that have rumbled on for more than 200 years. Continuing a 60-year career of contribution to statistical thought, Professor Cox is ideally placed to give the comprehensive, balanced account of the field that is now needed. The careful comparison of frequentist and Bayesian approaches to inference allows readers to form their own opinion of the advantages and disadvantages. Two appendices give a brief historical overview and the author's more personal assessment of the merits of different ideas. The content ranges from the traditional to the contemporary. While specific applications are not treated, the book is strongly motivated by applications across the sciences and associated technologies. The underlying mathematics is kept as elementary as feasible, though some previous knowledge of statistics is assumed. This book is for every serious user or student of statistics – in particular, for anyone wanting to understand the uncertainty inherent in conclusions from statistical analysis.

Sergey Dorofeev, Peter Grant. — **Statistics for real-life sample survey: non-simple-random samples and weighted data.** — Un vol. broché, 17,5 × 24,5, de IX, 266 p. — ISBN 0-521-67465-4. — Prix : £24.99. — Cambridge University Press, Cambridge, 2006.

This practical book looks beyond the ideal survey samples assumed in the classroom to the more complex and less perfect samples that are part of real life. Samples used in social and commercial surveys, especially of the general population, are usually less random (often by design and for good reason) than many people using them realise. Unless it is understood and allowed for, this "non-randomness" can compromise the inferences made from the data. This book introduces the challenges posed by less-than-perfect samples, giving background knowledge and practical guidance for those who have to deal with them. It explains why samples are, and sometimes should be, non-random in the first place; how to assess the degree of non-randomness; how to apply corrective weighting when appropriate; and how the statistical treatment of these samples must be adapted. This is a book for practising researchers. It is a source of reference for the methods and formulae needed to deal with commonly encountered situations and, above all, a source of realistic and implementable solutions.

B.S. Everitt. — **The Cambridge dictionary of statistics.** — Third edition. — Un vol. broché, 17,5 × 25, de IX, 432 p. — ISBN 0-521-69027-7 (relié : 0-521-86039-3). — Prix : £17.99 (relié : £45.00). — Cambridge University Press, Cambridge, 2006.

If you use statistics and need easy access to clear, reliable definitions and explanations of statistical and statistics-related concepts, then look no further than this dictionary. Over 3600 terms are defined, covering medical, survey, theoretical and applied statistics, including computational statistics. Entries are provided for standard and specialized statistical software. In addition, short biographies of over 100 important statisticians are given. Definitions provide enough mathematical detail to clarify concepts and give standard formulae when these are helpful. The majority of definitions then give a reference to a book or article where the user can find further or more specialized information, and many are accompanied by graphical material to aid understanding.

John M. Lewis, S. Lakshmivarahan, Sudarshan Dhall. — **Dynamic data assimilation: a least squares approach.** — Encyclopedia of mathematics and its applications, vol. 104. — Un vol. relié, 16,5 × 24, de XXII, 654 p. — ISBN 0-521-85155-6. — Prix : £80.00. — Cambridge University Press, Cambridge, 2006.

Dynamic data assimilation is the assessment, combination, and synthesis of observational data, scientific laws, and mathematical models to make predictions about how a complex physical system will behave. The topic is of increasing importance, as those involved,

for example, in numerical weather prediction seek to make reliable long-term weather forecasts beyond the few days presently feasible. This book is designed to be a basic one-stop reference for graduate students and researchers. It is based on graduate courses taught over a decade to mathematicians, scientists, and engineers, and its modular structure accommodates the various audience requirements. Thus Part I is a broad introduction to the history, development, and philosophy of data assimilation, illustrated by examples; Part II considers the classical, static approaches, both linear and nonlinear; and Part III describes computational techniques. Parts IV to VII are concerned with how statistical and dynamic ideas can be incorporated into the classical framework. Key themes covered here include estimation theory, stochastic and dynamic models, and sequential filtering. The final part addresses the predictability of dynamical systems.

Analyse numérique

Leszek DEMKOWICZ. — **Computing with hp-adaptive finite elements, vol. 1: One and two dimensional elliptic and Maxwell problems.** — Un vol. relié, 16×24, de 398 p. — ISBN 1-58488-671-4. — Prix: US$89.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2007.

Offering the only existing finite element (FE) codes for Maxwell equations that support hp refinements on irregular meshes, this book presents 1D and 2D codes and automatic hp adaptivity. This self-contained source discusses the theory and implementation of hp-adaptive FE methods, focusing on projection-based interpolation and the corresponding hp-adaptive strategy. — *Key features:* Develops a fully automatic hp-adaptive strategy to deliver optimal meshes with a minimum number of degrees of freedom. — Features an entire chapter on geometric modeling and mesh generation based on projection interpolation. — Provides multiple examples of solutions for a wide class of problems, including elliptic problems, elasticity, heat conduction, Maxwell equations, and scattering. — Contains an accompanying CD-ROM with 1D (1Dhp) code for two-point boundary-value problems and 2D (2Dhp) code that supports both H1- and H(curl)-conforming discretizations. algorithms and include the definitions of many graph theory terms used in the book.

D.V. GRIFFITHS, I.M. SMITH. — **Numerical methods for engineers.** — Second edition. — Un vol. relié, 16×24, de 479 p. — ISBN 1-58488-401-0. — Prix: US$79.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2006.

Numerical Methods for Engineers, Second Edition provides an introduction to numerical methods, incorporating theory with concrete computing exercises and programmed examples of the techniques presented. Covering a wide range of numerical applications that have immediate relevancy for engineers, this textbook describes 49 programs in Fortran 95. Many of the programs discussed use a sub-program library called nm_lib that holds 23 subroutines and functions. In addition, there is a precision module that controls the precision of calculations. — *New to the second edition:* Features coding upgraded to the new Fortran 90/95 for all programs. — Offers all source codes for download, along with a free Fortran 90 compiler for PC users. — Contains new programs and associated subroutines that are highly portable and will run on any computer platform, from PCs to mainframes. — Lists nearly 50 programs, many more concise through the use of "libraries" of approximately 25 subprograms that are described in the appendices. — Presents an introduction to adaptive numerical integration rules and the finite element method. — Provides a more comprehensive treatment of iterative techniques for the solution of linear simultaneous equations. — Includes many additional exercises and engineering examples.

Luis M. PARDO, Allan PINKUS, Endre SÜLI, Michael J. TODD, (Editors). — **Foundations of computational mathematics, Santander, 2005.** — London mathematical society lecture note series, 331. — Un vol. broché, 15×23, de VIII, 394 p. — ISBN 0-521-68161-8. — Prix: £40.00. — Cambridge University Press, Cambridge, 2006.

This volume is a collection of articles based on the plenary talks presented at the 2005 meeting, in Santander, of the Society for the Foundations of Computational Mathematics. The talks were given by some of the foremost world authorities in computational mathematics. The topics covered reflect the breadth of research within the area as well as the richness and fertility of interactions between seemingly unrelated branches of pure and applied mathematics. As a result, this volume will be of interest to researchers in the field of computational mathematics and also to non-experts who wish to gain some insight into the state of the art in this active and significant field.

Informatique

Diran BASMADJIAN and Ramin FARNOOD. — **The art of modeling in science and engineering with Mathematica®.** — Second edition. — Un vol. relié, 16×24, de 509 p. — ISBN 1-58488-460-6. — Prix: US$99.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2007.

Thoroughly revised and updated, *The Art of Modeling in Science and Engineering with Mathematica®, Second Edition* explores the mathematical tools and procedures used in modeling based on the laws of conservation of mass, energy, momentum, and electrical charge. The authors have culled and consolidated the best from the first edition and expanded the range of applied examples to reach a wider audience. The text proceeds, in measured steps, from simple models of real-world problems at the algebraic and ordinary differential equations (ODE) levels to more sophisticated models requiring partial differential equations. The traditional solution methods are supplemented with Mathematica®, which is used throughout the text to arrive at solutions for many of the problems presented.

Alfred GRAY, Elsa ABBENA, Simon SALAMON. — **Modern differential geometry of curves and surfaces with Mathematica®.** — Third edition. — Studies in advanced mathematics. — Un vol. relié, 18,5×26, de 984 p. — ISBN 1-58488-448-7. — Prix: US$89.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2006.

Presenting theory while using Mathematica® in a complementary way, the third edition of Alfred Gray's famous textbook covers how to define and compute standard geometric functions using Mathematica® for constructing new curves and surfaces from existing ones. Since Gray's death, authors Abbena and Salamon have stepped in to bring the book up to date. While maintaining Gray's intuitive approach, they reorganized the material to provide a clearer division between the text and the Mathematica® code and added a Mathematica® notebook as an appendix to each chapter. They also address important new topics, such as quaternions. The approach of this book is at times more computational than is usual for a book on the subject. For example, Brioschi's formula for the Gaussian curvature in terms of the first fundamental form can be too complicated for use in hand calculations, but Mathematica® handles it easily, either through computations or through graphing curvature. Another part of Mathematica® that can be used effectively in differential geometry is its special function library, where nonstandard spaces of constant curvature can be defined in terms of elliptic functions and then plotted. Using the techniques described in this book, readers will understand concepts geometrically, plotting

curves and surfaces on a monitor and then printing them. Containing more than 300 illustrations, the book demonstrates how to use Mathematica® to plot many interesting curves and surfaces. Including as many topics of the classical differential geometry and surfaces as possible, it highlights important theorems with many examples. It includes 300 miniprograms for computing and plotting various geometric objects, alleviating the drudgery of computing things such as the curvature and torsion of a curve in space.

Richard E. Klima, Neil P. Sigmon, Ernest L. Stitzinger. — **Applications of abstract algebra with Maple™ and Matlab®.** — Second edition. — Discrete mathematics and its applications. — Un vol. relié, 16×24, de 505 p. — ISBN 1-58488-610-2. — Prix: US$89.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2007.

Eliminating the need for heavy number-crunching, sophisticated mathematical software packages open the door to areas like cryptography, coding theory, and combinatorics that are dependent on abstract algebra. This title explores these topics and shows how to apply the software programs to abstract algebra and its related fields. Carefully integrating Maple™ and Matlab®, this book provides an in-depth introduction to real-world abstract algebraic problems. The first chapter offers a concise and comprehensive review of prerequisite advanced mathematics. The next several chapters examine block designs, coding theory, and cryptography while the final chapters cover counting techniques, including Pólya's and Burnside's theorems. Other topics discussed include the Rivest, Shamir, and Adleman (RSA) cryptosystem, digital signatures, primes for security, and elliptic curve cryptosystems. — *New to the second edition:* Three new chapters on Vigenère ciphers, the Advanced Encryption Standard (AES), and graph theory as well as new Matlab® and Maple™ sections. — Expanded exercises and additional research exercises. — Maple™ and Matlab® files and functions available for download online and from a CD-ROM.

Hang T. Lau. — **A Java library of graph algorithms and optimization.** — Discrete mathematics and its applications. — Un vol. relié, 18×26, de 386 p. — ISBN 1-58488-718-4. — Prix: US$99.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2007.

Because of its portability and platform-independence, Java is the ideal computer programming language to use when working on graph algorithms and other mathematical programming problems. Collecting some of the most popular graph algorithms and optimization procedures, *A Java Library of Graph Algorithms and Optimization* provides the source code for a library of Java programs that can be used to solve problems in graph theory and combinatorial optimization. Self-contained and largely independent, each topic starts with a problem description and an outline of the solution procedure, followed by its parameter list specification, source code, and a test example that illustrates the usage of the code. The book includes a CD-ROM with all the Java code used. The book begins with a chapter on random graph generation that examines bipartite, regular, connected, Hamilton, and isomorphic graphs as well as spanning, labeled, and unlabeled rooted trees. It then discusses connectivity procedures, followed by a paths and cycles chapter that contains the Chinese postman and traveling salesman problems, Euler and Hamilton cycles, and shortest paths. The author proceeds to describe two test procedures involving planarity and graph isomorphism. Subsequent chapters deal with graph coloring, graph matching, network flow, and packing and covering, including the assignment, bottleneck assignment, quadratic assignment, multiple knapsack, set covering, and set partitioning problems. The final chapters explore linear, integer, and quadratic programming. The appendices provide references that offer further details of the algorithms and include the definitions of many graph theory terms used in the book.

Rolf NIEDERMEIER. — **Invitation to fixed-parameter algorithms.** — Oxford lecture series in mathematics and its applications, vol. 31. — Un vol. relié, 16×24, de XI, 300 p. — ISBN 0-19-856607-7. — Prix: £55.00. — Oxford University Press, Oxford, 2006.

This research-level text is an application-oriented introduction to the growing and highly topical area of the development and analysis of efficient fixed-parameter algorithms for optimally solving computationally hard combinatorial problems. The book is divided into three parts: a broad introduction that provides the general philosophy and motivation; followed by coverage of algorithmic methods developed over the years in fixed-parameter algorithmics forming the core of the book; and a discussion of the essentials from parameterized hardness theory with a focus on W[1]-hardness which parallels NP-hardness, then stating some relations to polynomial-time approximation algorithms, and finishing up with a list of selected case studies to show the wide range of applicability of the presented methodology. Aimed at graduate and research mathematicians, programmers, algorithm designers, and computer scientists, the book introduces the basic techniques and results and provides a fresh view on this highly innovative field of algorithmic research.

David H. von SEGGERN. — **CRC standard curves and surfaces with Mathematica®.** — Second edition. — Chapman & Hall/CRC applied mathematics and nonlinear science series. — Un vol. relié, 18×26, de 556 p. — ISBN 1-58488-599-8. — Prix: US$79.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2007.

Since the publication of the first edition, Mathematica® has matured considerably and the computing power of desktop computers has increased greatly. This enables the presentation of more complex curves and surfaces as well as the efficient computation of formerly prohibitive graphical plots. Incorporating both of these aspects, *CRC Standard Curves and Surfaces with Mathematica®, Second Edition,* is a virtual encyclopedia of curves and functions that depicts nearly all of the standard mathematical functions rendered using Mathematica®. While the easy-to-use format remains unchanged from the previous edition, many chapters have been reorganized and better graphical representations of numerous curves and surfaces have been produced. An introductory chapter describes the basic properties of curves and surfaces, includes two handy tables of 2-D and 3-D curve and surface transformations, and provides a quick understanding of the basic nature of mathematical functions. To facilitate more efficient and more thorough use of the material, the whole gamut of curves and surfaces is divided into sixteen individual chapters. The accompanying CD-ROM includes Mathematica® notebooks of code to construct plots of all the functions presented in the book.

Robert E. WHITE. — **Elements of matrix modeling and computing with MATLAB®.** — Un vol. relié, 16×24, de XVI, 402 p. — ISBN 1-58488-627-7. — Prix: US$79.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2007.

As discrete models and computing have become more common, there is a need to study matrix computation and numerical linear algebra. Encompassing a diverse mathematical core, this book examines a variety of applications and their modeling processes, showing you how to develop matrix models and solve algebraic systems. Emphasizing practical skills, it creates a bridge from problems with two and three variables to more realistic problems that have additional variables. *Elements of Matrix Modeling and Computing with MATLAB®* focuses on seven basic applications: circuits, trusses, mixing tanks, heat conduction, data modeling, motion of a mass, and image filters. These applications are developed from very simple to more complex models. To explain the processes, the book explores numerous topics in linear algebra, including complex numbers and functions, matrices, algebraic systems, curve fitting, elements of linear differential equations, transform methods, and tools of computation. For example, the

author uses linearly independent vectors and subspaces to explain over- and under-determined systems, eigenvalues and eigenvectors to solve initial value problems, and discrete Fourier transforms to perform image filtering in the frequency domain. Although the primary focus is to cultivate calculation skills by hand, most chapters also include MATLAB® to help with more complicated calculations.

Mécanique des solides, élasticité et plasticité

P.A. MARTIN. — **Multiple scattering: interaction of time-harmonic waves with N obstacles.** — Encyclopedia of mathematics and its applications, vol. 107. — Un vol. relié, 16,5×24, de XII, 437 p. — ISBN 0-521-86554-9. — Prix: £75.00. — Cambridge, University Press, 2006.

The interaction of waves with obstacles is an everyday phenomenon in science and engineering, cropping up for example in acoustics, electromagnetism, seismology and hydrodynamics. The mathematical theory and technology needed to understand the phenomenon is known as multiple scattering, and this book is the first devoted to the subject. The author covers a variety of techniques, for example separation of variables, T-matrix and integral equation methods, describing first the single-obstacle method and then extending it to the multiple-obstacle case. A key ingredient in many of these extensions is an appropriate addition theorem: a coherent, thorough exposition of these theorems is given, and computational and numerical issues around them are explored. The application of these methods to different types of problems is also explained. In particular, sound waves, electromagnetic radiation, waves in solids and water waves. A comprehensive reference list of some 1400 items rounds off the book, which will be an essential reference on the topic for applied mathematicians, physicists and engineers.

Mécanique quantique

Silvia ARROYO CAMEJO. — **Skurrile Quantenwelt.** — Un vol. relié, 16×24, de XIII, 246 p. — ISBN 3-540-29720-0. — Prix: €29.95. — Springer, Berlin, 2006.

Von einem jungen Ausnahmetalent noch vor dem Abitur verfasst: das vorliegende Buch über die "skurrile Quantenwelt" schließt endlich die Lücke zwischen der meist oberflächlichen und formelfreien populärwissenschaftlichen Literatur und der allzu hochgestochenen, von höherer Mathematik überfrachteten Studienliteratur. Die erst 19jährige Silvia Arroyo Camejo gibt ihren Lesern – auf dem Niveau der Schulmathematik – eine Einführung in die Prinzipien der Quantenphysik. Sie gewährt einen tiefen Einblick in die Welt des Mikrokosmos sowie in das faszinierende Gebiet der kleinsten Teilchen, deren Verhaltensweisen sich fundamental von dem unterscheiden, was der gesunde Menschenverstand normalerweise erwartet.

Économie, recherche opérationnelle, jeux

Duncan ANGWIN, Stephen CUMMINGS, Chris SMITH. — **The strategy pathfinder: core concepts and micro-cases.** — Un vol. broché, 19×25, de XIII, 354 p. — ISBN 1-4051-2613-2. — Prix: £22.99. — Blackwell Publishing, Malden, Massachusetts, 2007.

The Strategy Pathfinder provides today's hard-pressed business students with a new, effective way to learn about business strategy. Built around micro-cases of real-life problems faced by

companies and executives, this "strategy i-pod" helps business students to engage with the kinds of situation they will encounter in their working lives whilst providing directional guidance and provoking discussions about key theoretical themes. The "live" situations are drawn from a wide range of business, social, military and virtual settings from the Americas, Asia, Europe, Africa, and Oceania.

Michel BIERLAIRE. — **Introduction à l'optimisation différentiable.** — Enseignement des mathématiques. — Un vol. broché, 16×24, de XVII, 532 p. — ISBN 2-88074-669-8. — Prix: SFr. 79.00. — Presses polytechniques et universitaires romandes, Lausanne, 2006.

Quoi de plus naturel, lorsqu'un système peut être décrit formellement, que de tenter de l'améliorer? L'auteur de cet ouvrage conduit le lecteur avec patience (et humour) à la découverte de méthodes algorithmiques qui permettent d'aborder cette question. Son propos se distingue par une approche progressive et détaillée, amplement supportée par des projets et exercices, par l'étendue du domaine couvert, par la qualité de sa documentation, ainsi que par un souci pédagogique constant et un souci permanent de l'illustration pertinente. Il propose ainsi une excellente introduction à un sujet en plein essor, tant du point de vue des applications, aujourd'hui innombrables, que de la compréhension plus profonde des concepts.

Information, communication, circuits

James A. ANDERSON. — **Automata theory with modern applications.** — With contributions by Tom HEAD. — Un vol. broché, 15×23, de VIII, 255 p. — ISBN 0-521-61324-8 (relié: 0-521-84887-3). — Prix: £24.99 (relié: £55.00). — Cambridge University Press, Cambridge, 2006.

Recent applications to biomolecular science and DNA computing have created a new audience for automata theory and formal languages. This is the only introductory book to cover such applications. It begins with a clear and readily understood exposition of the basic principles that assumes only a background in discrete mathematics. The first five chapters give a gentle but rigorous coverage of regular languages and Kleene's theorem, minimal automata and syntactic monoids, Turing machines, and decidability. Together, these chapters explain the relationship between context-free languages and pushdown automata. They include topics not found in other texts at this level, including codes, retracts, and semiretracts. The many examples and exercises (for which solutions are available) help to develop the reader's insight. Chapter 6 introduces combinatorics on words and then uses it to describe a visually inspired approach to languages that is a fresh but accessible area of current research. The final chapter explains recently developed language theory coming from developments in bioscience and DNA computing.