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BULLETIN BIBLIOGRAPHIQUE

Généralités

Elwyn R. BERLEKAMP, John H. CONWAY, Richard K. GUY. — **Winning ways for your mathematical plays, vol. 3.** — Second edition. — Un vol. broché, 18×23,5, de 276 p. — ISBN 1-56881-143-8. — Prix: US\$39.00. — A.K. Peters, Natick, Massachusetts, 2003.

In the quarter of a century since three mathematicians and game theorists collaborated to create *Winning Ways for your Mathematical Plays*, the book has become the definitive work on the subject of mathematical games. Now carefully revised and broken down into four volumes to accommodate new developments, the second edition retains the original's wealth of wit and wisdom. The authors' insightful strategies, blended with their witty and irreverent style, make reading a profitable pleasure. In volume 3, the authors examine games played in clubs, giving case studies for coin and paper-and-pencil games, such as dots and boxes and nimstring.

Alan J. BISHOP, M.A. CLEMENTS, Christine KEITEL, Jeremy KILPATRICK, Frederick K.S. LEUNG. — **Second international handbook of mathematics education.** — Deux vol. reliés, 16,5×24,5 de XIV, VII, 982 p. — ISBN 1-4020-1008-7. — Prix: €400.00. — Kluwer, Dordrecht, 2003.

The *Second International Handbook of Mathematics Education* is an essential resource for students, researchers, teacher educators and curriculum policy makers in the field of mathematics education. It is a follow-up to the first *Handbook*, which laid down the base-line in many areas of the field of mathematics education. The first *Handbook* was published in 1996, covering research done prior to 1994. This *Second Handbook* covers the changes and developments that have occurred in the field since 1994. It has a section focusing on public policy and mathematics education; and is an essential reference to all those who shape educational policy. — Contents: **Section 1: Political dimensions of mathematics education.** Section Editor: *C. Keitel*. **1.** Mathematics, mathematics education and economic conditions; *D. Woodrow*. **2.** Is mathematics for all? *P. Gates, C. Vistro-Yu*. **3.** Mathematical literacy; *E. Jablonka*. **4.** Lifelong mathematics education; *G. FitzSimons, D. Coben, J. O'Donoghue*. **5.** International comparative research in mathematics education; *D. Clarke*. **6.** Mathematics education in international and global contexts; *W. Atweh, P. Clarkson, B. Nebres*. **Section 2: Responses in mathematics education to technological developments.** Section Editor: *FK.S. Leung*. **7.** Technology and mathematics education: a multidimensional overview of recent research and innovation; *J.-B. Lagrange, M. Artigue, C. Laborde, L. Trouche*. **8.** Influence of technology on the mathematics curriculum; *Ngai-Ying Wong*. **9.** What can digital technologies take from and bring to research in mathematics education; *C. Hoyles, R. Noss*. **10.** Technology as a tool for teaching undergraduate mathematics; *M. Thomas, D. Holton*. **11.** Mathematics teacher education and technology; *J. Mousley, D. Lambdin, Y. Koc*. **Section 3: Issues in Research in Mathematics Education.** Section Editor: *J. Kilpatrick*. **12.** Getting the description right and making it count; *J. Adler, S. Lerman*.

13. The impact of educational research on mathematics education; *D. Wiliam*. 14. Preparing mathematics education researchers for disciplined inquiry; *J. Boaler, D. Ball, R. Even*. 15. Mathematics teachers as researchers; *C. Breen*. 16. Researching mathematics education in situations of social and political conflict; *R. Vithal, P. Valero*. 17. Obstacles to the dissemination of mathematics education research; *A. Begg*. **Section 4: Professional Practice in Mathematics Education.** Section Editor: *K. Clements*. 18. Challenging and changing mathematics teaching classroom practices; *D. Tirosh, A. Graeber*. 19. Towards a didactic model for assessment design in mathematics education; *M. van den Heuvel-Panhuizen, J. Becker*. 20. Values in mathematics teaching - The hidden persuaders? *A. Bishop, Wee Tiong Seah, Chien Chin*. 21. Regulating the entry of teachers of mathematics into the profession: Challenges, new models, and glimpses into the future; *M. Stephens*. 22. Examining the mathematics in mathematics teacher education; *T. Cooney, H. Wiegel*. 23. Educating new mathematics teachers: Integrating theory and practice, and the roles of practising teachers; *B. Jaworski, U. Gellert*. 24. Professional development in mathematics education: Trends and tasks; *O. Zaslavsky, O. Chapman, R. Leikin*.

Jonathan BORWEIN, David BAILEY. — **Mathematics by experiments: plausible reasoning in the 21st century.** — Un vol. relié, 16×23,5, de x, 288 p. — ISBN 1-5681-211-6. — Prix: US\$45.00. — A.K. Peters, Natick, Massachusetts, 2004.

Mathematicians have always used experiments and visualization to explore new ideas and ways to prove them. Using examples that truly represent the experimental methodology, this book provides the historical context of, and rationale behind, experimental mathematics. It shows how today, the use of advanced computing technology provides mathematicians with an amazing, previously unimaginable “laboratory”, in which examples can be analyzed, new ideas tested, and patterns discovered. This is a perfect introduction to the history and current state of research and technology in the growing field of experimental mathematics.

Hubert BOSSEK, (Editor). — **Mathematik Abitur.** — Basiswissen Schule. — Un vol. relié, 15×21,5, de 464 p. + 1 CD-ROM. — ISBN 3-411-71741-6 (Dudenverlag). — Prix: €22.95. — PAETEC Verlag für Bildungsmedien, Berlin, Dudenverlag, Mannheim, 2003.

Der Band “*Basiswissen Schule – Mathematik Abitur*” beweist, dass die Disziplin der Mathematik immer an Problemstellungen im Alltag festgemacht werden kann. Einleuchtende Beispiele motivieren beim Lernen, muss sich der Schüler doch mit so schwierigen Gebieten wie Funktionen, Differenzial- und Integralrechnung, komplexen Zahlen, Vektoren, analytischer Geometrie, Matrizen und Wahrscheinlichkeitstheorie befassen. Das ganze Abiturwissen für die Prüfung vorzubereiten reicht es aus, die 15 Kapitel durchzuackern. Den Abituren wird das wenig trösten – auf 464 Seiten passt so viel Stoff, dass einem vor lauter Formeln schwindelig wird. Dennoch, das Bändchen mit dem Basiswissen fürs Abitur ist ungemein prägnant und klärt ohne Umschweife, wie Probleme mithilfe der Mathematik zu lösen sind. Die mitgelieferte CD-ROM beinhaltet neben dem kompletten Text und vielen zusätzlichen Schaubildern und Grafiken auch ein wertvolles Hilfsprogramm: Mathcad 8 lässt sich von der CD installieren und bringt einen ungeheuren Lernvorteil.

K. ERIKSSON, D. ESTEP, C. JOHNSON. — **Applied mathematics: body and soul, vol. 1: Derivatives and geometry in \mathbb{R}^3 .** — Un vol. relié, 16,5×24, de XLIV, 426 p. — ISBN 3-540-00890-X. — Prix: €39.95. — Springer, Berlin, 2003.

Applied Mathematics: Body and Soul is a mathematics education reform project developed at Chalmers University of Technology and includes a series of volumes and software. The program is motivated by the computer revolution opening new possibilities of computa-

tional mathematical modeling in mathematics, science and engineering. It consists of a synthesis of mathematical analysis (soul), numerical computation (body) and application. The first three volumes present a modern version of calculus and linear algebra, including constructive/numerical techniques and applications intended for undergraduate programs in engineering and science. Other volumes present topics such as dynamical systems, fluid dynamics, solid mechanics and electro-magnetics on an advanced undergraduate/graduate level. This first volume presents basics of calculus starting with the construction of the natural, rational, real and complex numbers, and proceeding to analytic geometry in two and three space dimensions, Lipschitz continuous functions and derivatives, together with a variety of applications.

K. ERIKSSON, D. ESTEP, C. JOHNSON. — **Applied mathematics: body and soul, vol. 2: Integrals and geometry in \mathbb{R}^3 .** — Un vol. relié, $16,5 \times 24$, de XLIV, 360 p. — ISBN 3-540-00891-8. — Prix: €39.95. — Springer, Berlin, 2003.

This volume develops the Riemann integral as the solution to the problem of determining a function, given its derivative, and proceeds to generalizations in the form of initial value problems for general systems of ordinary differential equations, including a variety of applications. Linear algebra including numerics is also presented.

K. ERIKSSON, D. ESTEP, C. JOHNSON. — **Applied mathematics: body and soul, vol. 3: Calculus in several dimensions.** — Un vol. relié, $16,5 \times 24$, de XLIV, 428 p. — ISBN 3-540-00889-6. — Prix: €39.95. — Springer, Berlin, 2003.

This volume presents calculus in several variables including partial derivatives, multi-dimensional integrals, partial differential equations and finite element methods, together with a variety of applications modeled as systems of partial differential equations.

F. FAUVET, C. MITSCHI, (Editors). — **From combinatorics to dynamical systems: Journées de calcul formel, Strasbourg, 2002.** — IRMA lectures in mathematics and theoretical physics, vol. 3. — Un vol. broché, 17×24 , de vi, 162 p. — ISBN 3-11-017958-X. — Prix: €36.95. — Walter de Gruyter, Berlin, 2003.

This volume contains nine refereed research papers in various areas from combinatorics to dynamical systems with computer algebra as an underlying and unifying theme. Topics covered are irregular connections, rank reduction and summability of solutions of differential systems, asymptotic behaviour of divergent series, integrability of Hamiltonian systems, multiple zeta values, quasi polynomial formalism, Padé approximants related to analytic integrability, hybrid systems. The interactions between computer algebra, dynamical systems, and combinatorics discussed in this volume should be useful for both mathematicians and theoretical physicists who are interested in effective computation.

Helmut GRUNSKY. — **Helmut Grunsky: collected papers.** — Oliver ROTH and Stephan RUSCHEWEYH, (Editors). — Un vol. relié, 25×18 , de L, 480 p. — ISBN 3-88538-501-5. — Prix: €45.00. — Heldermann Verlag, Lemgo, 2004.

The book contains a tabular curriculum vitae of Helmut Grunsky, a list of his publications and all publications in full text. In a paper of 14 pages Christian Pommerenke describes Grunsky's work and influence in function theory from the mathematical point of view. The 20 page contribution of Reinhard Siegmund-Schultze, entitled *Helmut Grunsky (1904-1986) in the Third Reich: A Mathematician Torn Between Conformity and Dissent*, is one of the rare documents showing the difficult life of many mathematicians in the years of the Third Reich on the example of Helmut Grunsky. The contribution closes with the facsimile of a letter of Ludwig Bieberbach to Helmut Grunsky, giving a shocking insight into these dark years of recent German history.

M. HAZEWINKEL, (Editor). — **Handbook of algebra, vol. 3.** — Un vol. relié, 17×24,5, de XXI, 1161 p. — ISBN 0-444-51264-0. — Prix: €195.00. — Elsevier, Amsterdam, 2003.

Linear algebra: J.A. Hermida-Alonso: On linear algebra over commutative rings. — L. Rodman, Correction and addition. — *Category theory:* E. Manes: Monads of sets. — *Algebraic K-theory:* A. Kuku: Classical algebraic K-theory, the functors K_0, K_1, K_2 . — *Model theoretic algebra:* M. Prest: Model theory for algebra. — M. Prest: Model theory and modules. — *Commutative rings and algebras:* R.H. Villarreal: Monomial algebras and polyhedral geometry. — *Associative rings and algebras:* P.C. Eklof: Whitehead modules. — E.E. Enochs: Flat covers. — A. Facchini: The Krull-Schmidt theorem. — C. Faith: Coherent rings and annihilator conditions in matrix and polynomial rings. — T.Y. Lam: Hamilton's quaternions. — S.K. Sehgal: Group rings. — A. Tuganbaev: Semiregular, weakly regular, and π -regular rings. — A. Tuganbaev: Max rings and V -rings. — *Coalgebras:* W. Michaelis: Coassociative coalgebras. — *Lattices and partially ordered sets:* A. Pultr: Frames. — *Varieties of algebras, groups.* — V.A. Artamonov: Quasivarieties. — *Lie algebras:* C. Reutenauer: Free Lie algebras. — *Rings and algebras with additional structure:* A.I. Molev: Yangians and their applications. — F. Patras: Lambda-rings. — *Groups and semigroups:* L. Bartholdi, R.I. Grigorchuk and Z. Šunik': Branch groups.

Hans Werner HEYMANN. — **Why teach mathematics?: a focus on general education.** — Mathematics education library, vol. 33. — Un vol. relié, 16,5×24,5 de VII, 262 p. — ISBN 1-4020-1786-3. — Prix: €119.00. — Kluwer, Dordrecht, 2003.

The cultural and practical significance of mathematics in our society contrasts strikingly with the way adolescents experience mathematics in school. Mathematics teaching, it appears, succeeds in promoting abilities related to systematical and critical thinking, to problem solving, and to formulating rational arguments only for a minority of students. In this book, the author discusses a modern concept of general education that then helps to clarify both curricular and pedagogical deficits involved in conventional mathematics instruction. Thus, an outline of an alternative mathematics instruction can be provided — instruction that can justifiably claim to aim at concrete realization of the idea of general education.

Ken JOHNSON, Ted HERR, Judy KYSH. — **Crossing the river with dogs: problem solving for college students.** — Un vol. broché, 24×19, de XII, 490 p. — ISBN 1-931914-14-1. — Prix: €54.95. — Key College Publishing, Emeryville, California, 2004, distributed by Springer, Berlin.

From the preface: Problem solving has been defined as knowing what to do when you don't know what to do. Being one of the core human activities, it covers many daily functions such as going to the store, buying ingredients, and cooking a nutritionally sound meal. Typical problem solving involves communicating, gathering information, organizing the information, and implementing a plan. Imbedded within this context are specific skills that aid in big picture problem solving. Many of these skills have a mathematical basis. These skills plus improved communication are the focus of this book. All students can benefit from this book, whether majoring in math or not. This book is appropriate for a problem-solving course with an intermediate algebra prerequisite that could be taken as a general education math class. It is also appropriate for a liberal arts mathematics course. In addition, it works well in teacher credential programs for future elementary or secondary math teachers. Because much of the course is taught using groups, the course can provide teacher candidates a particularly valuable experience with this mode of learning and encourage them to incorporate cooperative learning in their own classes.

Steven G. KRANTZ. — **A handbook of real variables: with applications to differential equations and Fourier analysis.** — Un vol. relié, 16×24, de XII, 201 p. — ISBN 0-8176-4329-X. — Prix: SFr. 88.00. — Birkhäuser, Basel, 2004.

This concise, well-written real analysis handbook takes into account the classical theory of the subject and sheds light on its significant applications to differential equations and Fourier analysis. Ideal for the working engineer or scientist, the book uses ample examples and brief explanations – without a lot of proofs or axiomatic machinery – to give the reader quick, easy access to all of the key concepts and touchstone results of real analysis. Topics are systematically developed, beginning with sequences and series, and proceeding to topology, limits, continuity, derivatives, and Riemann integration. In the second half of the work, Taylor series, Weierstrass' Theorem, Fourier series, and the Baire Category Theorem are carefully discussed. Picard iteration and differential equations are treated in detail in the final chapter.

Robert J. LANG. — **Origami design secrets: mathematical methods for an ancient art.** — Un vol. broché, 21,5×28, de VIII, 585 p. — ISBN 1-56881-194-2. — Prix: US\$48.00. — A.K. Peters, Natick, Massachusetts, 2003.

Robert J. Lang, one of the world's foremost origami artists and scientists, presents the never-before-described mathematical and geometric principles that allow anyone to design original origami, something once restricted to an elite few. From the theoretical underpinnings to detailed step-by-step folding sequences, this book takes a modern look at the heart of the centuries-old art of origami. Origami novices will appreciate the organization of the book, which begins with easy techniques and progresses to deep and powerful tools for design, all based on simple, intuitive concepts like grafting, circle packing, and assembly of tiles. Both novices and aficionados will find detailed, step-by-step instructions for numerous previously unpublished models, including the famous "Black Forest Cuckoo Clock".

Paulo NEY DE SOUZA, Jorge-Nuno SILVA. — **Berkeley problems in mathematics.** — Third edition. — Un vol. broché, 15,5×23,5, de XIV, 591 p. — ISBN 0-387-00892-6. — Prix: €39.95. — Springer, New York, 2004.

The book is a compilation of over 1250 problems that have appeared on the preliminary exams in Berkeley over the last twenty-five years. It is an invaluable source of problems and solutions for every mathematics student who plans to enter a Ph.D. program. Students who work through this book will develop problem-solving skills in areas such as real analysis, multivariable calculus, differential equations, metric spaces, complex analysis, algebra, and linear algebra. The problems are organized by subject and ordered in an increasing level of difficulty. Tags with the exact exam year provide the opportunity to rehearse complete examinations. The appendix includes instructions on accessing electronic versions of the exams as well as a syllabus and statistics of passing scores. This new edition has been updated with the most recent exams, including exams given during the Fall 2003 semester.

Harald SCHEID, Dieter KINDINGER, (Herausgeber). — **Mathematik I: ein Lexikon zur Schulmathematik für das 5. bis 10. Schuljahr.** — 7., neu bearbeitete Auflage. — Schülerduden. — Un vol. relié, 12,5×19, de 512 p. — ISBN 3-411-04207-9. — Prix: €16.90. — Dudenverlag, Mannheim, 2004.

Diese neu bearbeitete Auflage enthält das Grundwissen aller Themen, die in der Sekundarstufe I behandelt werden, wie Arithmetik, Teilbarkeitslehre, Algebra, Gleichungslehre, Geometrie und Trigonometrie. Gerade wenn man ein Schulbuch zum Jahresende meist wieder abgeben muss, ist es sehr hilfreich, ein Buch zu Hause zu haben, mit dem man den

wichtigsten Lernstoff jedes Schuljahres und alle Formeln immer griffbereit hat. Ein Verzeichnis mit Literaturhinweisen sowohl zum Lernen wie zur Unterhaltung rundet den Band ab.

Harald SCHEID, Dieter KINDINGER, (Herausgebern). — **Mathematik II: ein Lexikon zur Schulmathematik für das 11. bis 13. Schuljahr.** — 5., neu bearbeitete Auflage. — Schülerduden. — Un vol. relié, 12,5×19, de 476 p. — ISBN 3-411-04275-3. — Prix: €16.90. — Dudenverlag, Mannheim, 2004.

Gerade in der Mathematik der Oberstufe muss zur Abiturvorbereitung eine enorme Wissensfülle bewältigt werden. Da ist es von großem Vorteil, wenn man ein Hilfsmittel zur Hand hat, das einen kompakten Überblick bietet. Diese 5., neu bearbeitete Auflage umfasst den Stoff der Sekundarstufe II, also Analysis, Stochastik, lineare Algebra und analytische Geometrie. Besonders ausgewählte Themen (wie fraktale Geometrie, Monte-Carlo-Methode, Spieltheorie) oder herausragende Persönlichkeiten (Euler, Leibniz) werden in ausführlichen Blickpunkten genauer behandelt. Im Anhang finden sich eine Übersicht der häufigsten mathematischen Zeichen und eine Sammlung der für die Schule wichtigsten Formeln.

Hans BORUKI. — **Logarithmen und Exponentialgleichungen: Grundbegriffe, Rechengesetze, Lösungsverfahren.** — 2., aktualisierte Auflage. — Duden Schülerhilfen, Mathematik, 10. Klasse. — Un vol. broché, 15×22, de 112 p. — ISBN 3-411-05662-2. — Prix: €9.95. — Dudenverlag, Mannheim, 2004.

Dieses Buch für das Fach Mathematik bietet Schülern der 10. Klasse reichhaltiges Übungsmaterial zum Verständnis des oftmals unbeliebten Schulstoffes. Sie stellt in großer Ausführlichkeit das erforderliche Grundwissen über die Logarithmengesetze und die logarithmischen Gleichungen dar und bietet mit seinen zahlreichen Aufgaben reichlich Gelegenheit, den übermittelten Lernstoff einzuüben. Für die Lösung von Exponentialgleichungen werden die verschiedenen Verfahren vorgestellt und eingeübt. Der umfassende Abschlusstest eignet sich wunderbar, um vor den Klassenarbeiten das eigene Wissen zu testen und Verständnislücken zu schließen.

Peter WALKER. — **Examples and theorems in analysis.** — Un vol. broché, 18×23,5, de x, 287 p. — ISBN 1-85233-493-2. — Prix: €34.95. — Springer, London, 2004.

This book takes a unique and very practical approach to mathematical analysis. It makes the subject more accessible by giving the examples equal status with the theorems. The results are introduced and motivated by reference to examples which illustrate their use, and further examples then show how far the assumptions may be relaxed before the result fails. The contents cover: sequences; functions and continuity; differentiation; constructive integration; improper integrals; series; applications. A number of applications show what the subject is about, and what can be done with it; the applications in Fourier theory, distributions and asymptotics show how the results may be put to use. Exercises at the end of each chapter, of varying levels of difficulty, develop new ideas and present open problems.

Peter WINKLER. — **Mathematical puzzles: a connoisseur's collection.** — Un vol. broché, 15×23, de xi, 164 p. — ISBN 1-56881-201-9. — Prix: US\$18.00. — A.K. Peters, Natick, Mass., 2004.

The author reveals his puzzle collection, compiled over decades. The reader can share more than 100 of the best (and some of the toughest) mathematical puzzles ever to appear in one volume. There is no need of a professional acquaintance with mathematics; a bright high school student has what it takes.

Nabuyuki YOSHIGAHARA. — **Puzzles 101: a puzzlemaster's challenge.** — Translated by Richard WEYHRAUCH and Yasuko WEYHRAUCH. — Un vol. broché, 13×19, de x, 121 p. — ISBN 1-56881-206-X. — Prix: US\$ 14.00. — A.K. Peters, Natick, Mass., 2004.

The latest collection by the internationally acclaimed puzzlemaster Nob Yoshigahara covers a wide variety of puzzles, selected to keep the reader interested and motivated. Solutions are provided in a separate section, which will help novices get on the right track and will give seasoned aficionados a chance to check their work. The author is a celebrated inventor, collector, and champion of puzzles. He is the author of more than 70 books, has monthly puzzle columns in several popular magazines.

Histoire

Bernhelm BOOSS-BAVNBK, Jens HØYRUP, (Editors). — **Mathematics and war.** — Un vol. broché, 17×24, de VIII, 416 p. — ISBN 3-7643-1634-9. — Prix: SFr. 60.00. — Birkhäuser, Basel, 2003.

This book gives a broad picture of the increasingly intimate intercourse of the world of weapons with that of theorems. It shows to what extent the military has played an active part in the shaping of modern mathematics and the careers of mathematicians, in particular since World War II. It investigates how mathematical thinking, mathematical methods, and mathematically supported technology are now about to change the character and performance of modern warfare, and how this influences the public as well as the military. It describes the ethical choices of outstanding individuals like the physicist Niels Bohr and the mathematician Alan Turing in times of war and addresses the question to what extent general ethical discussions can provide guidance for working mathematicians. Finally, it analyzes the role of mathematical thinking in shaping the modern international law of war and peace and the role of mathematical arguments in support for actual conflict resolution.

Leo CORRY. — **Modern algebra and the rise of mathematical structures.** — Second revised edition. — Un vol. broché, 17×24, de 472 p. — ISBN 3-7643-7002-5. — Prix: SFr. 98.00. — Birkhäuser, Basel, 2003.

The notion of a mathematical structure is among the most pervasive ones in twentieth century mathematics. Part one of the book discusses the process whereby the aims and scope of the discipline of algebra were deeply transformed, turning it into that branch of mathematics dealing with a new kind of mathematical entities: the “algebraic structures”. But what is a mathematical structure and what is the place of this notion within the whole fabric of mathematics? Part two describes the historical roots, the early stages and the interconnections between three attempts to address these questions from a purely formal, mathematical perspective: Oystein Ore’s lattice-theoretical theory of structures, Nicolas Bourbaki’s theory of structures, and the theory of categories and functors.

Marco PANZA. — **Newton.** — Figures du savoir. — Un vol. broché, 13,5×21, de 270 p. — ISBN 2-251-76039-3. — Prix: €13.00. — Société d’édition Les Belles Lettres, Paris, 2003.

Isaac Newton (1642-1727) est à l’origine d’une révolution culturelle dont les effets continuent à se faire sentir. L’auteur des *Principia mathematica* (1684) a donné sa pleine expansion à la science – telle que la conçoivent les modernes – en mathématisant le monde, en l’expliquant sans faire intervenir de considération sur la structure ultime du cosmos ou sur

le plan de Dieu pour l'univers. On essaie ici de restituer les grands moments de l'œuvre de cet immense savant, associé à la naissance de l'astronomie moderne; à l'explication du mouvement des planètes (avec l'hypothèse d'une force gravitationnelle attirant ces planètes vers le soleil ainsi que les unes vers les autres); à la théorie du mouvement (la mécanique) qu'elle suppose; à une explication des phénomènes de la couleur appuyée sur une conception nouvelle de la structure de la lumière; à de grands résultats mathématiques, entre autres l'invention du calcul infinitésimal. On évoque également sa théologie, son activité politique et administrative, son intérêt pour l'histoire et pour l'alchimie: c'est la place de la rationalité dans la société moderne qui s'en trouve du même coup dévoilée.

Christian PIGUET, Heinz HÜGLI. — **Du zéro à l'ordinateur: une brève histoire du calcul.** — Un vol. broché, 15 × 23, de VIII, 182 p. — ISBN 2-88074-469-5. — Prix: SFr. 39.00. — Presses polytechniques et universitaires romandes, Lausanne, 2004.

Ce livre expose de manière claire et progressive la façon dont sont nées les idées qui ont conduit à la réalisation des ordinateurs et des microprocesseurs actuels. Il offre au lecteur les clés lui permettant de mieux comprendre la nature et le fonctionnement de ces machines. L'histoire du calcul débute avec l'apparition des systèmes de numération et l'invention du zéro, elle se poursuit avec la conception des premières machines à calculer mécaniques et électro-mécaniques, puis aboutit enfin aux machines électroniques. Ces dernières apparaissent d'abord sous la forme d'ordinateurs primitifs constitués de volumineux tubes à vide, avant d'évoluer vers les machines sophistiquées que nous connaissons aujourd'hui, composées de millions de minuscules transistors en silicium. Richement illustrée, proposant fils conducteurs et détails de fonctionnement, l'histoire exposée dans cet ouvrage intéressera tous ceux et celles curieux de connaître la genèse et l'avènement des ordinateurs.

Lucio RUSSO. — **The forgotten revolution: how science was born in 300 BC and why it had to be reborn.** — Un vol. broché, 24 × 16, de IX, 487 p. — ISBN 3-540-20396-6. — Prix: €29.95. — Springer, Berlin, 2004.

In the age of Archimedes and Euclid (third century BC) science as we know it was born, and gave rise to sophisticated technology that would not be seen again until the 18th century. This scientific revolution was accompanied by great changes in many other fields, such as art and medicine. What were the landmarks of this enormous cultural shift? Why are they so little known today? How do they relate to the post-1500 science that we are familiar with? What led to the end of ancient science? These are the questions that this book discusses, in the belief that the answers bear on choices we face today.

Yakov SINAI, (Editor). — **Russian mathematicians in the 20th century.** — Un vol. broché, 26 × 19, de XI, 700 p. — ISBN 981-238-385-9. — Prix: £ 67.00. — World Scientific, Singapore, 2003.

This book, which presents the main achievements of Russian mathematicians in the 20th century, has been produced as a gesture of respect and appreciation and it will serve as a good reference and an inspiration for future mathematicians. The editor has taken pains to select leading Russian mathematician such as Lyapunov, Luzin, Egorov, Kolmogorov, Pontryagin, Vinogradov, Sobolev, Petrovski and Krein, and their most important works. The editor has tried to provide some parity and, at the same time, included papers that are of interest even today. The original works of the great mathematicians will prove to be enjoyable to readers and useful to the many researchers who are preserving the interest in how mathematics was done in the former Soviet Union.

Analyse combinatoire

Titu ANDREESCU, Zuming FENG. — **A path to combinatorics for undergraduates: counting strategies.** — Un vol. broché, 15×23 , de xviii, 228 p. — ISBN 0-8176-4288-9. — Prix: SFr. 75.00. — Birkhäuser, Boston, 2004.

A Path to Combinatorics for Undergraduates is unique in its creative approach and presentation of material: unconventional, essay-type, non-routine combinatorial examples followed by a number of carefully selected challenging problems and extensive discussions of their solutions. New mathematical tools and methods are acquired, thanks to the interplay between well-organized combinatorial concepts and practical problems that bridge ordinary high school permutation/combination examples and exercises. A good foundation in combinatorics is provided in the early chapters that cover ideas in combinatorial geometry, e.g., Sylvester's problem, convexity, covering, dissections, and Euclidean Ramsey theorems. Later chapters deal with concepts in set theory, number theory and group theory — for example, cardinality, the Chinese Remainder Theorem, modulo operations, affine projections, all of which are innovatively implemented in combinatorial type problems. Lastly, problems in the language of combinatorics are translated into the language of graph theory. This book serves as a solid stepping stone for more advanced combinatorics studies in related mathematical science fields or in computer science.

Arthur T. BENJAMIN, Jennifer J. QUINN. — **Proofs that really count: the art of combinatorial proof.** — The Dolciani mathematical expositions, vol. 27. — Un vol. relié, $18,5 \times 26$, de xiv, 193 p. — ISBN 0-88385-333-7. — Prix: £28.00. — Cambridge University Press, Cambridge, 2003.

Mathematics is the science of patterns, and mathematicians attempt to understand these patterns and discover new ones using a variety of tools. In this book the authors demonstrate that many number patterns, even very complex ones, can be understood by simple counting arguments. The book explores more than 200 identities throughout the text and exercises, frequently emphasizing numbers not often thought of as numbers that count: Fibonacci Numbers, Lucas Numbers, Continued Fractions, and Harmonic Numbers, to name a few. Numerous hints and references are given for all chapter exercises and many chapters end with a list of identities in need of combinatorial proof. The extensive appendix of identities will be a valuable resource.

L. H. HARPER. — **Global methods for combinatorial isoperimetric problems.** — Cambridge studies in advanced mathematics, vol. 90. — Un vol. relié, $16 \times 23,5$, de xiv, 232 p. — ISBN 0-521-83268-3. — Prix: £40.00. — Cambridge University Press, Cambridge, 2004.

Certain constrained combinatorial optimization problems have a natural analog in the continuous setting of the classical isoperimetric problem. The study of so-called combinatorial isoperimetric problems exploits similarities between these two seemingly disparate settings. This text focuses on global methods. This means that morphisms, typically arising from symmetry or direct product decomposition, are employed to transform new problems into more restricted and easily solvable settings whilst preserving essential structure. This book is based on Professor Harper's many years' experience in teaching this subject and is ideal for graduate students entering the field.

Kenneth H. ROSEN. — **Mathématiques discrètes.** — Édition révisée. — Un vol. broché, $20,5 \times 25,5$, de xvi, 792 p. — ISBN 2-89461-642-2. — Prix: SFr. 110.50. — Chelonière/McGraw-Hill, 2002, distribué par Servidis, Genève.

Pour le grand public, l'utilisation de l'ordinateur est devenue tellement simple qu'on peut aisément oublier toute la complexité de son fonctionnement. Il en va cependant tout

autrement pour l'informaticien(ne) de carrière. Ceux-ci doivent comprendre comment leurs outils sont conçus pour les améliorer ou pour résoudre de nouveaux problèmes. Dans ce manuel, on trouvera une présentation des mathématiques qui permettent de modéliser ou d'étudier de très nombreuses structures informatiques: les mathématiques discrètes. On y traite notamment de logique, de dénombrement, des relations, des graphes et des arbres, de l'algèbre de Boole, des machines à états finis et des machines de Turing. L'expérience de l'auteur dans les domaines de l'enseignement et de l'industrie contribue à faire de *Mathématiques discrètes* un ouvrage remarquable, car il propose à la fois un exposé clair et rigoureux de la théorie et une présentation de ses plus pertinentes applications.

Douglas R. STINSON. — **Combinatorial designs: constructions and analysis.** — Un vol. relié, 16×24, de xvi, 300 p. — ISBN 0-387-95487-2. — Prix: €64.95. — Springer, New York, 2004.

This book aims to thoroughly develop the most important techniques used for constructing combinatorial designs. The book provides a detailed and clear exposition of the classical core of combinatorial designs, treating the material progressively from simple to more complex. Readers will master various construction techniques, both classic and modern, and will be well prepared to build a vast array of combinatorial designs. The main prerequisites are familiarity with basic abstract algebra, linear algebra, and some number theory fundamentals. A variety of exercises enhance the book's utility as a course text.

Théorie des nombres

Şaban ALACA, Kenneth S. WILLIAMS. — **Introductory algebraic number theory.** — Un vol. broché, 17,5×25, de xviii, 428 p. — ISBN 0-521-54011-9 (relié: 0-521-83250-0). — Prix: £24.99 (relié: £65.00). — Cambridge University Press, Cambridge, 2004.

Algebraic number theory is a subject which came into being through the attempts of mathematicians to try to prove Fermat's last theorem and that now has a wealth of applications to Diophantine equations, cryptography, factoring, primality testing, and public-key cryptosystems. This book provides an introduction to the subject suitable for senior undergraduates and beginning graduate students in mathematics. The material is presented in a straightforward, clear, and elementary fashion, and the approach is hands on, with an explicit computational flavor. Prerequisites are kept to a minimum, and numerous examples illustrating the material occur throughout the text. References to suggested readings and to the biographies of mathematicians who have contributed to the development of algebraic number theory are given at the end of each chapter. There are more than 320 exercises, an extensive index, and helpful location guides to theorems and lemmas in the text.

David CHUDNOVSKY, Gregory CHUDNOVSKY, Melvyn B. NATHANSON, (Editors). — **Number theory: New York Seminar 2003.** — Un vol. relié, 16×24, de viii, 272 p. — ISBN 0-387-40655-7. — Prix: €109.95. — Springer, New York, 2004.

This volume marks the twentieth anniversary of the New York Number Theory Seminar (NYNTS). Beginning in 1982, the NYNTS has tried to present a broad spectrum of research in number theory and related fields of mathematics, from physics to geometry, to combinatorics and computer science. The list of seminar speakers includes not only Fields Medalists and other established researchers, but also many other younger and less well known mathematicians whose theorems are significant and whose work may become the next big thing in number theory.

Corps et polynômes

Ronald S. IRVING. — **Integers, polynomials, and rings.** — Undergraduate texts in mathematics. — Un vol. broché, $15,5 \times 23,5$, de xv, 284 p. — ISBN 0-387-20172-6. — Prix: €39.95. — Springer, New York, 2004.

Mathematics is often regarded as the study of calculation, but in fact, mathematics is much more. It combines creativity and logic in order to arrive at abstract truths. This book is intended to illustrate how calculation, creativity, and logic can be combined to solve a range of problems in algebra. Not all topics in a traditional algebra course are covered. Rather, the author focuses on integers, polynomials, their ring structure, and fields, with the aim that students master a small number of serious mathematical ideas. One non-standard feature of the book is the small number of theorems for which full proofs are given. Many proofs are left as exercises, and for almost every such exercise, a detailed hint or outline of the proof is provided. These exercises form the heart of the text.

Géométrie algébrique

Jeffrey BERGEN, Stefan CATOIU, William CHIN, (Editors). — **Hopf algebras: proceedings from the international conference at DePaul University.** — Lecture notes in pure and applied mathematics, vol. 237. — Un vol. broché, $17,5 \times 25,5$, de viii, 262 p. — ISBN 0-8247-5566-9. — Prix: US\$185.00. — Marcel Dekker, New York, 2004.

Over the spread of 18 groundbreaking refereed papers, *Hopf Algebras* tenders a new proof for the Skolem-Noether theorem... offers an alternative treatment for Hopf algebras of dimension p^2 ... exemplifies integrals for bialgebras and almost commutative Hopf algebras lacking coquasitriangularity... illustrates the realization of bialgebras using the Myhill-Nerode theorem and Fliess' theorem... establishes representations of two parameter quantum groups and proves an analog of Schur-Weyl duality... fuses Fourier theory for coalgebras and bicointegrals with injectivity in bicomodules... discusses support cones for infinitesimal group schemes... inspects coassociative coalgebras, relatively free coalgebras, and coalgebras from formulas... ascertains the coradical of the dual of a lifting of a quantum plane... summarizes results on the classification of Hopf algebras of dimension pq ... explores pre-Lie, dendriform, and Nichols algebras... and studies properties of a relative Hopf module over a subring of coinvariants.

Jean FRESNEL, Marius VAN DER PUT. — **Rigid analytic geometry and its applications.** — Progress in mathematics, vol. 218. — Un vol. relié, 16×24 , de xi, 296 p. — ISBN 0-8176-4206-4. — Prix: SFr. 144.00. — Birkhäuser, Boston, 2004.

Today the theory of rigid (analytic) spaces has applications to arithmetic algebraic geometry, number theory, the arithmetic of function fields, and p -adic differential equations. This work, a revised and greatly expanded new English edition of the earlier French text by the same authors, is an accessible introduction to the theory of rigid spaces and now includes a large number of exercises. — *Contents:* Valued fields and normed spaces. — The projective line. — Affinoid algebras. — Rigid spaces. — Curves and their reductions. — Abelian varieties. — Points of rigid spaces, rigid cohomology. — Étale cohomology of rigid spaces. — Covers of algebraic curves.

Susanne SCHMITT, Horst G. ZIMMER. — **Elliptic curves: a computational approach.** — With an appendix by Attila PETHŐ. — De Gruyter studies in mathematics, vol. 31. — Un vol. relié, ix, 367 p. — ISBN 3-11-016808-1. — Prix: €78.00. — Walter de Gruyter, Berlin, 2003.

The purpose of the present textbook is to give an elementary introduction to elliptic curves. This branch of number theory is particularly accessible to computer assisted calculations, and the authors make use of this feature by approaching the theory from a computational point of view. Specifically, the computer-algebra package SIMATH is applied on several occasions. However, the book can also be read by those not interested in the computational aspect. Of course, the theory of elliptic curves is very comprehensive and becomes correspondingly sophisticated in its application. Hence, the authors have made a careful selection of the topics treated. These topics include the determination of torsion groups, computations regarding the Mordell-Weil group, height calculations, S -integral points. The content is kept as elementary as possible, and therefore the book differs significantly from the numerous textbooks on elliptic curves nowadays available.

Hal SCHENCK. — **Computational algebraic geometry.** — London Mathematical Society student texts, vol. 58. — Un vol. broché, $15,5 \times 23$, de xiv, 193 p. — ISBN 0-521-53650-2 (relié: 0-521-82964-X). — Prix: £18.95 (relié: £50.00). — Cambridge University Press, Cambridge, 2003.

The interplay between algebra and geometry is a beautiful (and fun) area of mathematical investigation. Recent advances in computing and algorithms make it possible to tackle many classical problems in a down-to-earth and concrete fashion. Suitable for graduate students, the objective of this book is to bring advanced algebra to life with lots of examples. The first three chapters provide an introduction to commutative algebra and connections to geometry. The rest of the book focuses on three active areas of contemporary algebra: Homological algebra (the snake lemma, long exact sequence in homology, functors and derived functors, and double complexes). — Algebraic combinatorics and algebraic topology (simplicial complexes and simplicial homology, Stanley-Reisner rings, upper bound theorem and polytopes). — Algebraic geometry (points and curves in projective space, Riemann-Roch theorem, Čech cohomology, regularity).

Jörg SCHÜRMANN. — **Topology of singular spaces and constructible sheaves.** — Monografie matematyczne, vol. 63. — Un vol. relié, $17,5 \times 23,5$, de x, 452 p. — ISBN 3-7643-2189-X. — Prix: SFr. 158.00. — Birkhäuser, Basel, 2003.

Assuming that the reader is familiar with sheaf theory, the book gives a self-contained introduction to the theory of constructible sheaves related to many kinds of singular spaces, such as cell complexes, triangulated spaces, semialgebraic and subanalytic sets, complex algebraic or analytic sets, stratified spaces, and quotient spaces. The relations to the underlying geometrical ideas are worked out in detail, together with many applications to the topology of such spaces. All chapters have their own detailed introduction, containing the main results and definitions, illustrated in simple terms by a number of examples. The technical details of the proof are postponed to later sections, since these are not needed for the applications.

Algèbre linéaire et multilinéaire, théorie des matrices

Jounādi ABDELJAOUED, Henri LOMBARDI. — **Méthodes matricielles: introduction à la complexité algébrique.** — Mathématiques & applications, vol. 42. — Un vol. broché, $15,5 \times 23,5$, de xv, 376 p. — ISBN 3-540-20247-1. — Prix: €65.36. — Springer, Paris, 2004.

Ce livre est une introduction à la théorie de la complexité algébrique basée sur un panorama des méthodes algorithmiques en algèbre linéaire exacte. Il donne en particulier les principaux algorithmes pour le calcul du polynôme caractéristique. Il donne aussi une discus-

sion détaillée des méthodes de multiplication rapide des polynômes et des matrices, sans pour autant réclamer de prérequis théoriques de haut niveau. Tout en étant centré sur les problèmes de complexité algébrique, il aborde aussi la complexité binaire. Une place importante est accordée au parallélisme. Le livre se termine par une introduction raisonnée à l'importante théorie de Valiant concernant un analogue algébrique de la conjecture $P \neq NP$. Ce livre se remarque par l'étendue des sujets traités tout en restant très lisible.

Anneaux et algèbres

Alberto FACCHINI, Evan HOUSTON, Luigi SALCE, (Editors). — **Rings, modules, algebras, and Abelian groups: proceedings of the Algebra Conference – Venezia.** — Lecture notes in pure and applied mathematics, vol. 236. — Un vol. broché, $17,5 \times 25,5$, de xx, 497 p. — ISBN 0-8247-4807-7. — Prix: US\$185.00. — Marcel Dekker, New York, 2004.

This book collects stimulating discussions from world-renowned names including Laszlo Fuchs, Robert Gilmer, Saharon Shelah, Daniel Simson, and Richard Swan. Describing emerging theories, *Rings, Modules, Algebras, and Abelian Groups* summarizes the proceedings of a recent algebraic conference held at Venice International University, Italy... celebrates the past 40 years of study on commutative rings... merges the perspectives and research of algebraists from a variety of disciplines... and presents new perspectives on connections between ring theoretic and module theoretic results.

B. J. GARDNER, R. WIEGANDT. — **Radical theory of rings.** — Pure and applied mathematics, vol. 261. — Un vol. relié, $15,5 \times 23,5$, de xii, 387 p. — ISBN 0-8247-5033-0. — Prix: US\$185.00. — Marcel Dekker, New York, 2004.

Written in clear algebraic terms, this book provides a systematic treatment of the theory of Kurosh-Amitsur radicals as well as of concrete radicals of associative rings... delves into hereditary, supernilpotent, special, supplementing, normal, subidempotent, and A-radicals... gradually introduces concrete radicals as examples of the general theory... arrives at the study of nil radicals and Jacobson, Brown-McCoy, Behrens, antisimple, strongly prime, and generalized nil radicals... discusses in detail the density theorem, Wedderburn-Artin theorems, and the Litoff-Anh theorem... and examines the radicals of matrix and polynomial rings and their connection with Koethe's problem.

Kevin MCCRIMMON. — **A taste of Jordan algebras.** — Universitext. — Un vol. relié, 16×24 , de xxv, 562 p. — ISBN 0-387-95447-3. — Prix: €74.95. — Springer, New York, 2004.

The author describes the history of Jordan algebras, and he describes in full mathematical detail the recent structure theory for Jordan algebras of arbitrary dimension due to Efim Zel'manov. To keep the exposition elementary, the structure theory is developed for linear Jordan algebras, though the modern quadratic methods and the Zel'manov results go beyond the previous textbooks on Jordan theory, written in the 1960s and 1980s before the theory reached its final form.

Catégories, algèbre homologique, cohomologie des groupes

Maria Cristina PEDICCHIO, Walter THOLEN, (Editors). — **Categorical foundations: special topics in order, topology, algebra, and sheaf theory.** — Encyclopedia of mathematics and its applications, vol. 97. — Un vol. relié, 16×24 , de xii, 417 p. — ISBN 0-521-83414-7. — Prix: £60.00. — Cambridge University Press, Cambridge, 2004.

The book offers categorical introductions to order, topology, algebra, and sheaf theory, suitable for graduate students, teachers, and researchers of pure mathematics. Readers

familiar with the most basic notions of category theory will learn about the main tools that are used in modern categorical mathematics but are not readily available in the literature. Hence, in eight independent chapters, the reader will encounter various ways of how to study “spaces”: order-theoretically via their open-set lattices, as objects of a fairly abstract category via their interaction with other objects, or via their topoi of set-valued sheaves. Likewise, “algebras” are treated as both models for Lawvere’s algebraic theories and Eilenberg-Moore algebras for monads, but they appear also as the objects of an abstract category with various levels of “exactness” conditions. The abstract methods are illustrated by applications that, in many cases, lead to results not yet found in more traditional presentations of the various subjects, for instance, on the exponentiability of spaces and embeddability of algebras. Suggestions for further studies and research are also given.

Théorie des groupes et généralisations

C. M. CAMPBELL, E. F. ROBERTSON, G. C. SMITH, (Editors). — **Groups St Andrews 2001 in Oxford.** — London Mathematical Society lecture note series, vol. 304, 305. — 2 vol. brochés, 15×23, de 598 p. — ISBN 0-521-53740-1 (vol. 1), 0-521-53739-8 (vol. 2). — Prix : £ 70.00. — Cambridge University Press, Cambridge, 2003.

These volumes contain selected papers from the international conference “Groups St Andrews 2001 in Oxford”, which was held at the University of Oxford in August 2001. Five main lecture courses were given at the conference, and articles based on their lectures form a substantial part of the Proceedings. The series of Proceedings of Groups St Andrews conferences has provided snapshots of the state of research in group theory throughout the past twenty years. As with earlier publications, these refereed volumes also contain accessible surveys of contemporary research fronts, as well as a diverse collection of short research articles. They form a valuable reference for researchers, especially graduate students.

Richard Mark WEISS. — **The structure of spherical buildings.** — Un vol. relié, 16×24, de xi, 135 p. — ISBN 0-691-11733-0. — Prix : £29.95. — Princeton University Press, Princeton, 2003.

This book provides a clear and authoritative introduction to the theory of buildings, a topic of central importance to mathematicians interested in the geometric aspects of group theory. Its detailed presentation makes it suitable for graduate students as well as specialists. The author begins with an introduction to Coxeter groups and goes on to present basic properties of arbitrary buildings before specializing to the spherical case. Buildings are described throughout in the language of graph theory. — *Contents:* Chamber systems. — Coxeter groups. — Roots. — Reduced words. — Opposites. — 2-interiors. — Buildings. — Apartments. — Spherical buildings. — Extensions of isometries. — The Moufang property. — Root group labelings.

Groupes topologiques ; groupes et algèbres de Lie

Nick DUNGEY, A. F. M. TER ELST, Derek W. ROBINSON. — **Analysis on Lie groups with polynomial growth.** — Progress in mathematics, vol. 214. — Un vol. relié, 16×24, de viii, 312 p. — ISBN 0-8176-3225-5. — Prix : SFr. 148.00. — Birkhäuser, Boston, 2003.

This book is the first to present a method for examining the surprising connection between invariant differential operators and almost periodic operators on a suitable nilpotent

Lie group. It deals with the theory of second-order, right invariant, elliptic operators on a large class of manifolds: Lie groups with polynomial growth. In systematically developing the analytic and algebraic background on Lie groups with polynomial growth, it is possible to describe the large time behavior for the semigroup generated by a complex second-order operator with the aid of homogenization theory and to present an asymptotic expansion. Further, the text goes beyond the classical homogenization theory by converting an analytical problem into an algebraic one.

Roger GODEMENT. — **Introduction à la théorie des groupes de Lie.** — Un vol. broché, 15,5×23,5, de ix, 305 p. — ISBN 3-540-20034-7. — Prix: €42.61. — Springer, Berlin, 2004.

Ces notes de cours donnés il y a une trentaine d'années à Paris mais restées d'actualité couvrent la théorie générale des groupes de Lie, ainsi que quelques points de la théorie des groupes topologiques, groupes discontinus notamment. Le cas des groupes linéaires, exposé avant la théorie générale par la méthode de von Neumann, permet d'expliquer plus naturellement le formalisme de celle-ci. Ce livre pourra aussi compléter les volumes III et IV de l'*Analyse mathématique* du même auteur, parus également chez Springer.

Helmut STRADE. — **Simple Lie algebras over fields of positive characteristic: I. Structure theory.** — De Gruyter expositions in mathematics, vol. 38. — Un vol. relié, 17,5×24,5, de viii, 540 p. — ISBN 3-11-014211-2. — Prix: €128.00. — Walter de Gruyter, Berlin, 2004.

The final Block-Wilson-Strade-Premet Classification Theorem is a landmark result of modern mathematics and can be formulated as follows: *Every finite dimensional simple Lie algebra over an algebraically closed field of characteristic $p > 3$ is of classical Cartan, or Melikian type.* In this two-volume book, the author is assembling the proof of the Classification Theorem with explanations and references. The goal is a state-of-the-art account on the structure and classification theory of Lie algebras over fields of positive characteristic leading to the forefront of current research in this field. This first volume is devoted to preparing the ground for the classification work to be performed in the second volume. The concise presentation of the general theory underlying the subject matter and the presentation of classification results on a subclass of the simple Lie algebras for all odd primes will make this volume an invaluable source and reference for all research mathematicians and advanced graduate students in algebra.

Fonctions de variables réelles

Alberto GUZMAN. — **Derivatives and integrals of multivariable functions.** — Un vol. broché, 15,5×23,5, de x, 319 p. — ISBN 0-8176-4274-9. — Prix: SFr. 98.00. — Birkhäuser, Boston, 2004.

This work examines derivatives and integrals of functions of several real variables. Topics from advanced calculus are covered, including: differentiability and its relation to partial derivatives, directional derivatives and the gradient, surfaces, inverse and implicit functions, integrability and properties of integrals, and the theorems of Fubini, Stokes, and Gauss. The order of topics reflects the order of development in calculus: limits, continuity, derivatives, integrals — a sequencing that allows generalizations from and analogies to elementary results, such as the second-derivative test and the Chain Rule. *Derivatives and Integrals of Multivariable Functions* has a definition-theorem-proof format, together with a conversational style, including historical comments, an abundance of questions, and discussions about

strategy, difficulties, and alternative paths. It is aimed at advanced undergraduate pure mathematics majors whose next course will be real analysis with measure theory. Required background includes theoretical work in linear algebra, one-variable calculus, properties of continuous functions, and related topological material. The last two are used in the context of Euclidean space, but a strong grounding in the corresponding real-line topics will suffice.

Mesure et intégration

M.M. RAO. — **Measure theory and integration.** — Second edition, revised and expanded. — Pure and applied mathematics, vol. 265. — Un vol. relié, $16 \times 23,5$, de xix, 761 p. — ISBN 0-8247-5401-8. — Prix: US\$185.00. — Marcel Dekker, New York, 2004.

Significantly revised and expanded, this authoritative reference/text comprehensively describes concepts in measure theory, classical integration, and generalized Riemann integration of both scalar and vector types – providing a complete and detailed review of every aspect of measure and integration theory offering valuable examples, exercises, and applications. This book examines the Henstock-Kurzweil integral with approaches not found in any other text.

Équations différentielles ordinaires

James C. ROBINSON. — **An introduction to ordinary differential equations.** — Un vol. broché, $17,5 \times 24,5$, de xiv, 399 p. — ISBN 0-521-53391-0 (relié: 0-521-82650-0). — Prix: £24.95 (relié: £65.00). — Cambridge University Press, Cambridge, 2004.

This refreshing, introductory textbook covers both standard techniques for solving ordinary differential equations, as well as introducing students to qualitative methods such as phase-plane analysis. The presentation is concise, informal yet rigorous. Topics such as Euler's method, difference equations, the dynamics of the logistic map, and the Lorenz equations, demonstrate the vitality of the subject, and provide pointers to further study. The author also encourages a graphical approach to the equations and their solutions, and to that end the book is profusely illustrated. The MATLAB files used to produce many of the figures are provided in an accompanying website.

Équations aux dérivées partielles

Vincenzo ANCONA, Jean VAILLANT, (Editors). — **Hyperbolic differential operators and related problems.** — Lecture notes in pure and applied mathematics, vol. 233. — Un vol. broché, $18 \times 25,5$, de ix, 371 p. — ISBN 0-8247-0963-2. — Prix: US\$175.00. — Marcel Dekker, New York, 2003.

Offering original research from more than 30 international authorities, this reference provides a complete arsenal of tools and theorems to analyze systems of hyperbolic partial differential equations — investigating a wide variety of problems in areas such as thermodynamics, electromagnetics, fluid dynamics, differential geometry, and topology. Rejuvenating thought in the field of mathematical physics, contributors to this book define the notion of pseudosymmetry for matrix symbols of order zero, as well as the notion of time function... construct a general calculus of pseudodifferential operations on a smoothly stratified space...

propose edge Sobolev spaces for the study of weak hyperbolicity for linear and semilinear operators... apply stochastic methods to determine the ground state of an atomic molecular system... and prove numerous results about the wellposedness of the Cauchy problem in the classes of C^∞ functions, Grevy and Sobolev functions, and the Cauchy-Kowalevskaya theorem.

Fuensanta ANDREU-VAILLO, Vicent CASELLES, José M. MAZÓN. — **Parabolic quasilinear equations minimizing linear growth functionals.** — Progress in mathematics, vol. 223. — Un vol. relié, $16 \times 23,5$, de XIV, 337 p. — ISBN 3-7643-0400-6. — Prix: SFr. 140.00. — Birkhäuser, Basel, 2004.

This book contains a detailed mathematical analysis of the variational approach to image restoration based on the minimization of total variation submitted to the constraints given by the image acquisition model. This model, initially introduced by Rudin, Osher and Fatemi, had a strong influence on the development of variational methods for image denoising and restoration, and pioneered the use of the BV model in image processing. After a full analysis of the model, the minimizing total variation flow under different boundary conditions is studied and its main qualitative properties are exhibited. In particular, several explicit solutions of the denoising problem are computed.

Vladimir I. ARNOLD. — **Lectures on partial differential equations.** — Universitext. — Un vol. broché, $15,5 \times 23,5$, de x, 157 p. — ISBN 3-540-40448-1. — Prix: €39.95. — PHASIS, Moscow, Springer, Berlin, 2004.

Like all Vladimir Arnold's books, this one is full of geometric insight. Arnold illustrates every principle with a figure. This book aims to cover the most basic parts of the subject and confines itself largely to the Cauchy and Neumann problems for the classical linear equations of mathematical physics, especially Laplace's equation and the wave equation, although the heat equation and the Korteweg-de Vries equation are also discussed. Physical intuition is emphasized. A large number of problems are sprinkled throughout the book, and a full set of problems from examinations given in Moscow are included at the end. Some of these problems are quite challenging!

Pierluigi COLLI, Claudio VERDI, Augusto VISINTIN, (Editors). — **Free boundary problems: theory and applications.** — International series of numerical mathematics, vol. 147. — Un vol. relié, 17×24 , de VIII, 346 p. — ISBN 3-7643-2193-8. — Prix: SFr. 158.00. — Birkhäuser, Basel, 2004.

Many phenomena of interest for applications are represented by differential equations which are defined in a domain whose boundary is a priori unknown, and is accordingly named a "free boundary". A further quantitative condition is then provided in order to exclude indeterminacy. Free boundary problems encompass a broad spectrum of applied mathematics which is represented in this state-of-the art volume by a variety of contributions of researchers in mathematics and applied fields like physics, biology, and material sciences. Special emphasis has been reserved for mathematical modeling and for the formulation of new problems.

Gennadii V. DEMIDENKO, Stanislav V. USPENSKII. — **Partial differential equations and systems not solvable with respect to the highest-order derivative.** — Pure and applied mathematics, vol. 256. — Un vol. relié, 16×24 , de XI, 338 p. — ISBN 0-8247-4039-4. — Prix: US\$195.00. — Marcel Dekker, New York, 2003.

Offering in-depth analyses of current theories and approaches related to Sobolev-type equations and systems, this text/reference is the first to introduce a classification of equations

and systems not solvable with respect to a higher-order derivative, and studies boundary-value problems for these classes of equations — specifically partial differential equations for applications in mechanics, physics, hydrodynamics, and oceanology. It presents previously unpublished results, solvability theorems, and research.

Gisèle RUIZ GOLDSTEIN, Rainer NAGEL, Silvia ROMANELLI, (Editors). — **Evolution equations.** — Lecture notes in pure and applied Mathematics, vol. 234. — Un vol. broché, 18×25,5, de XXI, 410 p. — ISBN 0-8247-0975-6. — Prix: US\$175.00. — Marcel Dekker, New York, 2003.

Celebrating the work of renowned mathematician Jerome A. Goldstein, this reference compiles original research on the theory and application of evolution equations to stochastics, physics, engineering, biology, and finance — exploring a wide range of topics in linear and nonlinear semigroup theory, operator theory, functional analysis, and linear and nonlinear partial differential equations. The book studies the latest theoretical developments and uses of evolution equations in a wide variety of disciplines.

Eric SONNENDRÜCKER, (Editor). — **Three courses on partial differential equations.** — IRMA lectures in mathematics and theoretical physics, vol. 4. — Un vol. broché, 17×24, de VI, 162 p. — ISBN 3-11-017958-X. — Prix: €36.95. — Walter de Gruyter, Berlin, 2003.

This book provides an introduction to three different topics in partial differential equations stemming from applications. The subject of the first course is equilibrium positions of several disks rolling on a wire. In particular, existence and uniqueness of and the exact position for an equilibrium are discussed. The second course deals with problems arising from acoustics and geophysics where waves propagate in complicated media, the properties of which can only be described statistically. It turns out that if the different scales presented in the problem can be separated, there exists a deterministic result. The third course is devoted to so-called inverse problems, where one or several parameters of a partial differential equation need to be determined by using, for instance, measurements on the boundary of the domain. The question that arises naturally is what information is necessary to determine the unknown parameters. This question is answered in different settings.

Systèmes dynamiques et théorie ergodique

Sergey BEZUGLYI, Sergey KOLYADA, (Editors). — **Topics in dynamics and ergodic theory.** — London Mathematical Society lecture note series, vol. 310. — Un vol. broché, 15×23, de VIII, 262 p. — ISBN 0-521-53365-1. — Prix: £30.00. — Cambridge University Press, Cambridge, 2003.

This book contains a collection of survey papers by leading researchers in ergodic theory and low-dimensional and topological dynamics; it comprises nine chapters on a range of important topics. These include: the role and usefulness of ultrafilters in ergodic theory, topological dynamics and Ramsey theory; topological aspects of kneading theory together with an analogous two-dimensional theory called pruning; the dynamics of Markov odometers, Bratteli-Vershik diagrams and orbit equivalence of non-singular automorphisms; geometric proofs of Mather's connecting and accelerating theorems; recent results in one-dimensional smooth dynamics; periodic points of non expansive maps; arithmetic dynamics; the defect of factor maps; and entropy theory for actions of countable amenable groups.

Heinz-Otto PEITGEN, Harmut JÜRGENS, Dietmar SAUPE. — **Chaos and fractals: new frontiers of science.** — Second edition. — Un vol. relié, 24×20, de XIII, 864 p. — ISBN 0-387-20229-3. — Prix: €69.95. — Springer, New York, 2004.

The fourteen chapters of this book cover the central ideas and concepts of chaos and fractals as well as many related topics including: the Mandelbrot set, Julia sets, cellular automata, L-systems, percolation and strange attractors. The new edition has been updated in many places. The appendices of the original edition were taken out since more recent publications cover this material in more depth. Instead of the focused computer program in BASIC, the authors provide 10 interactive JAVA-applets for this second edition.

Analyse de Fourier, analyse harmonique abstraite

Wolfgang KELLER. — **Wavelets in geodesy and geodynamics.** — Un vol. relié, 17,5×24,4, de X, 279 p. — ISBN 3-11-017546-0. — Prix: €84.00. — Walter de Gruyter, Berlin, 2004.

For many years, digital signal processing has been governed by the theory of Fourier transform and its numerical implementation. The main disadvantage of Fourier theory is the underlying assumption that the signals have time-wise or space-wise invariant statistical properties. In many applications the deviation from a stationary behavior is precisely the information to be extracted from the signals. Wavelets were developed to serve the purpose of analyzing such instationary signals. The book gives an introduction to wavelet theory both in the continuous and the discrete case. After developing the theoretical fundament, typical examples of wavelet analysis in the Geosciences are presented.

Transformations intégrales, calcul opérationnel

Gunther UHLMANN, (Editor). — **Inside out: inverse problems and applications.** — Mathematical Sciences Research Institute publications, vol. 47. — Un vol. relié, 16×24, de XII, 400 p. — ISBN 0-521-82469-9. — Prix: £50.00. — Cambridge University Press, Cambridge, 2003.

Inverse problems arise in practical situations like geophysical exploration, medical imaging, and nondestructive evaluation, where measurements made on the exterior of a body are used to determine properties of the inaccessible interior. In the last twenty years there have been substantial developments in the mathematical theory of inverse problems, and applications have expanded greatly. In this book leading experts in the theory and applications of inverse problems offer extended surveys of such vital and rapidly expanding areas as microlocal analysis, reflection seismology, tomography, inverse scattering, and X-ray transforms.

Analyse fonctionnelle

H. Garth DALES, Pietro AIENA, Jörg ESCHMEIER, Kjeld LAURSEN, George WILLIS. — **Introduction to Banach algebras, operators, and harmonic analysis.** — London Mathematical Society student texts, vol. 57. — Un vol. broché, 15×23, de XI, 324 p. — ISBN 0-521-53584-0 (relié: 0-521-82893-7). — Prix: £24.95 (relié: £60.00). — Cambridge University Press, Cambridge, 2003.

This work has arisen from lecture courses given by the authors on important topics within functional analysis. The authors, who are all leading researchers, give introductions to their

subjects at a level ideal for beginning graduate students as well as others interested in the subject. The collection has been carefully edited to form a coherent and accessible introduction to current research topics. The first chapter by Professor Dales gives the general theory of Banach algebras, serving as a background to the remaining material. Dr Willis then studies a centrally important Banach algebra, the group algebra of locally compact group. The remaining chapters are devoted to Banach algebras of operators on Banach spaces: Professor Eschmeier gives all the background for the exciting topic of invariant subspaces of operators, and discusses some key open problems; Dr Laursen and Professor Aiena discuss local spectral theory for operators, leading into Fredholm theory.

Théorie des opérateurs

Sergio ALBEVERIO, Michael DEMUTH, Elmar SCHROHE, Bert-Wolfgang SCHULZE, (Editors). — **Non-linear hyperbolic equations, spectral theory, and wavelet transformations.** — Operator theory: advances and applications, vol. 145. — Un vol. relié, 17×24 , de vii, 437 p. — ISBN 3-7643-2168-7. — Prix: SFr. 198.00. — Birkhäuser, Basel, 2004.

This volume focuses on recent developments in non-linear and hyperbolic equations. In the first contribution, the singularities of the solutions of several classes of non-linear partial differential equations are investigated. Applications concern the Monge-Ampère equation, quasi-linear systems arising in fluid mechanics as well as integro-differential equations for media with memory. There follows an article on L_p - L_q decay estimates for Klein-Gordon equations with time-dependent coefficients, explaining, in particular, the influence of the relation between the mass term and the wave propagation speed. Another paper addresses questions of local existence of solutions, blow-up criteria, and C^∞ regularity for quasilinear weakly hyperbolic equations. Spectral theory of semibounded selfadjoint operators is the topic of a further contribution, providing upper and lower bounds for the bottom eigenvalue as well as an upper bound for the second eigenvalue in terms of capacity estimates. The wavelet transformation and the Gabor transformation are two distinguished tools in signal processing with a wide range of applications. The result presented here concerns the construction of an interpolating family between them.

Jürgen APPELL, Espedito DE PASCALE, Alfonso VIGNOLI. — **Nonlinear spectral theory.** — De Gruyter Series in Nonlinear Analysis and Applications, vol. 10. — Un vol. relié, $17,5 \times 24,4$, de xi, 408 p. — ISBN 3-11-018143-6. — Prix: €84.00. — Walter de Gruyter, Berlin, 2004.

In view of the eminent importance of spectral theory or linear operators in many fields of mathematics and physics, it is not surprising that various attempts have been made to define and study spectra also for nonlinear operators. The first chapter briefly recalls the definition and properties of the spectrum and several subspectra for bounded linear operators. Then some numerical characteristics for nonlinear operators are introduced which are useful for describing those classes of operators for which there exists a spectral theory. Since spectral values are closely related to solvability results for operator equations, various conditions for the local or global invertibility of a nonlinear operator are collected in the third chapter. The following two chapters are concerned with spectra for certain classes of continuous, Lipschitz continuous or differentiable operators. These spectra, however, simply adapt the corresponding definitions from the linear theory which somehow restricts their applicability. Other spectra which are defined in a completely different way, but seem to have useful applications,

are defined and studied in the following four chapters. The remaining three chapters are more application-oriented and deal with nonlinear eigenvalue problems, numerical ranges, and selected applications to nonlinear problems.

Israel GOHBERG, Antonio FERREIRA DOS SANTOS, Frank-Olme SPECK, Francisco SEPULVEDA TEIXEIRA, Wolfgang WENDLAND, (Editors). — **Operator theoretical methods and applications to mathematical physics: The Erhard Meister memorial volume.** — Operator theory: advances and applications, vol. 147. — Un vol. relié, 17×24 , de xv, 473 p. — ISBN 3-7643-6634-6. — Prix: SFr. 258.00. — Birkhäuser, Basel, 2004.

This volume is devoted to the memory of the applied mathematician Erhard Meister (1930-2001). It is divided into two parts. Part A contains reminiscences about the life of E. Meister including a short biography and an exposition of his professional work. Part B displays the wide range of his scientific interests through eighteen original papers contributed by authors with close scientific and personal relations to Erhard Meister. It covers various fields of mathematical physics and its theoretical background like partial differential equations, singular integral and pseudodifferential equations as well as topics from operator theory and complex analysis. Altogether colleagues, friends and family members contributed to honour E. Meister as a researcher and promoter of science and succeeded in drawing a real picture of his life and work.

Calcul des variations et contrôle optimal

Youssef JABRI. — **The Mountain Pass Theorem: variants, generalizations and some applications.** — Encyclopedia of mathematics and its applications, vol. 95. — Un vol. relié, 16×24 , de xii, 369 p. — ISBN 0-521-82721-3. — Prix: £158.00. — Cambridge University Press, Cambridge, 2003.

This book presents min-max methods through a comprehensive study of the different faces of the celebrated Mountain Pass Theorem (MPT) of Ambrosetti and Rabinowitz. The reader is gently led from the most accessible results to the forefront of the theory, and at each step in this walk between the hills, the author presents the extensions and variants of the MPT in a complete and unified way. Coverage includes standard topics: the classical and dual MPT; second-order information from (PS) sequences; symmetry and topological index theory; perturbations from symmetry; convexity; and more. But it also covers other topics covered nowhere else in book form: the nonsmooth MPT; the geometrically constrained MPT; numerical approaches to the MPT; and even more exotic variants.

Bruce VAN BRUNT. — **The calculus of variations.** — Universitext. — Un vol. relié, 15×24 , de xiii, 290 p. — ISBN 0-387-40247-0. — Prix: €69.95. — Springer, New York, 2003.

The calculus of variations has a long history of interaction with other branches of mathematics, such as geometry and differential equations, and with physics, particularly mechanics. More recently, the calculus of variations has found applications in other fields, such as economics and electrical engineering. Much of the mathematics underlying control theory, for instance, can be regarded as part of the calculus of variations. This book is an introductory account of the calculus of variations suitable for advanced undergraduate and graduate students of mathematics, physics, or engineering. The mathematical background assumed of the reader is a course in multivariable calculus, and some familiarity with elements of real analysis and ordinary differential equations.

Géométrie

András BEZDEK, (Editor). — **Discrete geometry.** — Pure and applied mathematics, vol. 253. — Un vol. relié, 16×24 , de xvii, 461 p. — ISBN 0-8247-0968-3. — Prix: US\$175.00. — Marcel Dekker, New York, 2003.

Celebrating the work of Professor W. Kuperberg, this reference explores packing and covering theory, tilings, combinatorial and computational geometry, and convexity — featuring an extensive collection of problems compiled at the Discrete Geometry Special Session of the American Mathematical Society in New Orleans, Louisiana. The book analyzes packings and coverings with congruent convex bodies... arrangements on the sphere... line transversals... Euclidean and spherical tilings... geometric graphs... polygons and polyhedra... and fixing systems for convex figures. Offering research and contributions from more than 50 esteemed international authorities, *Discrete Geometry* is a fascinating collection for pure and applied mathematicians, geometers, topologists, combinatorialists, and upper-level undergraduate and graduate students in these disciplines.

Géométrie différentielle

Rafał ABLAMOWICZ, Garret SOBCZYK, (Editors). — **Lectures on Clifford (geometric) algebras and applications.** — Un vol. broché, $15,5 \times 23,5$, de xvii, 221 p. — ISBN 0-8176-3257-3. — Prix: SFr. 56.00. — Birkhäuser, Boston, 2004.

The subject of Clifford geometric algebras offers a unified algebraic framework for the direct expression of the geometric concepts underlying the mathematical theories of linear and multilinear algebra, projective and affine geometries, and differential geometry. This bird's eye view of Clifford geometric algebras and their applications is presented by six of the world's leading experts in the field. — Key topics and features of this systematic exposition include: An introductory chapter on Clifford Algebras by Pertti Lounesto. — Ian Porteous reveals the mathematical structure of Clifford algebras in terms of the classical groups. — John Ryan introduces the basic concepts of Clifford analysis, which extends the well-known complex analysis of the plane to three and higher dimensions. — William Baylis investigates some of the extensive applications that have been made in mathematical physics, including the basic ideas of electromagnetism and special relativity. — John Selig explores the successes that Clifford algebras, especially quaternions and bi-quaternions, have found in computer vision and robotics. — Tom Branson discusses some of the deepest results that Clifford algebras have made possible in our understanding of differential geometry. — The editors (Appendix) give an extensive review of various software packages for computations with Clifford algebras including standalone programs, on-line calculators, special purpose numeric software, and symbolic add-ons to computer algebra systems.

Abbas BAHRI. — **Flow lines and algebraic invariants in contact form geometry.** — Progress in nonlinear differential equations and their applications, vol. 53. — Un vol. relié, 16×24 , de vii, 219 p. — ISBN 0-8176-4318-4. — Prix: SFr. 170.00. — Birkhäuser, Boston, 2004.

This text features a careful treatment of flow lines and algebraic invariants in contact form geometry, a vast area of research connected to symplectic field theory, pseudo-holomorphic curves, and Gromov-Witten invariants (contact homology). In particular, this work develops a novel algebraic tool in this field: rooted in the concept of critical points at infinity, the new

algebraic invariants defined here are useful in the investigation of contact structures and Reeb vector fields. The book opens with a review of prior results and then proceeds through an examination of variational problems, non-Fredholm behavior, true and false critical points at infinity, and topological implications. An increasing convergence with regular and singular Yamabe-type problems is discussed, and the intersection between contact form and Riemannian geometry is emphasized, with specific focus on a unified approach to non-compactness in both disciplines. Fully detailed, explicit proofs and a number of suggestions for further research are provided throughout.

Dennis BARDEN, Charles THOMAS. — **An introduction to differential manifolds.** — Un vol. broché, de XI, 218 p. — ISBN 1-86094-355-1 (relié: 1-86094-354-3). — Prix: £19.00 (relié: £30.00). — Imperial College Press, London, 2003, distributed by World Scientific Publishing, Singapore.

This invaluable book, based on the many years of teaching experience of both authors, introduces the reader to the basic ideas in differential topology. Among the topics covered are smooth manifolds and maps, the structure of the tangent bundle and its associates, the calculation of real cohomology groups using differential forms (de Rham theory), and applications such as the Poincaré-Hopf theorem relating the Euler number of a manifold and the index of a vector field. Each chapter contains exercises of varying difficulty for which solutions are provided. Special features include examples drawn from geometric manifolds in dimension 3 and Brieskorn varieties in dimensions 5 and 7, as well as detailed calculations for the cohomology groups of spheres and tori.

Alfred GRAY. — **Tubes.** — Second edition. — Progress in mathematics, vol. 223. — Un vol. relié, 16×23,5, de XIII, 280 p. — ISBN 3-7643-6907-8. — Prix: SFr. 112.00. — Birkhäuser, Basel, 2004.

Contents: An introduction to Weyl's tube formula. — Fermi coordinates and Fermi fields. — The Riccati equation for second fundamental forms. — The proof of Weyl's tube formula. — The generalized Gauss-Bonnet theorem. — Chern forms and Chern numbers. — The tube formula in the complex case. — Comparison theorems for tube volumes. — Power series expansions for tube volumes. — Steiner's formula. — Mean-value theorems. — This second edition, which consists of newly added historical notes and figures in *Mathematica*, presents a comprehensive examination of Weyl's formula for the volume of a tube, its roots and its implications. Graduate students having a basic knowledge of differential geometry as well as researchers and instructors in the areas of analysis, differential geometry, topology, and mathematical physics will benefit from this excellent text.

Katsuharo SHIOHAMA, Takashi SHIOYA, Minoru TANAKA. — **The geometry of total curvature on complete open surfaces.** — Cambridge tracts in mathematics, vol. 159. — Un vol. relié, 16×23,5, de IX, 284 p. — ISBN 0-521-45054-3. — Prix: £47.50. — Cambridge University Press, Cambridge, 2003.

This is an account of how some modern ideas in differential geometry can be used to tackle and extend classical results in integral geometry. The authors investigate the influence of the total curvature on the metric structure of complete non compact Riemannian 2-manifolds, though their work, much of which has never appeared in book form before, can be extended to more general spaces. Many classical results are introduced and then extended by the authors. The compactification of complete open surfaces is discussed, as are Busemann functions for rays. Open problems are provided in each chapter, and the text is plentifully illustrated with figures designed to improve the reader's intuitive understanding of the subject

matter. The treatment is self-contained, assuming only a basic knowledge of manifold theory, and so is suitable for graduate students and non-specialists who seek an introduction to this modern area of differential geometry.

Gerard WALSCHAP. — **Metric structures in differential geometry.** — Graduate texts in Mathematics, vol. 224. — Un vol. relié, 16×24 , de VIII, 226 p. — ISBN 0-387-20430-X. — Prix: €69.95. — Springer, New York, 2004.

This text is an introduction to the theory of differentiable manifolds and fiber bundles. The only requisites are a solid background in calculus and linear algebra, together with some basic point-set topology. The first chapter provides a comprehensive overview of differentiable manifolds. The following two chapters are devoted to fiber bundles and homotopy theory of fibrations. Vector bundles have been emphasized, although principal bundles are also discussed in detail. The last three chapters study bundles from the point of view of metric differential geometry: Euclidean bundles, Riemannian connections, curvature, and Chern-Weil theory are discussed, including the Pontrjagin, Euler, and Chern characteristic classes of a vector bundle. These concepts are illustrated in detail for bundles over spheres. Chapter 5, with its focus on the tangent bundle, also serves as a basic introduction to Riemannian geometry in the large. This book can be used for a one-semester course on manifolds or bundles, or a two-semester course in differential geometry.

Topologie algébrique

Gregory ARONE, John HUBBUCK, Ran LEVI, Michael WEISS, (Editors). — **Categorical decomposition techniques in algebraic topology: International Conference in Algebraic Topology, Isle of Skye, Scotland, June 2001.** — Progress in mathematics, vol. 215. — Un vol. relié, $16 \times 23,5$, de VI, 302 p. — ISBN 3-7643-0400-6. — Prix: SFr. 138.00. — Birkhäuser, Basel, 2004.

The book consists of articles on the frontier of current research in algebraic topology. It presents recent results by top-notch experts, and is intended primarily for researchers and graduate students working in the field of algebraic topology. — *Key topics:* Categorical decomposition techniques currently used in algebraic topology, such as Goodwillie's "calculus of functors", and various approximation techniques which are useful for the study of classifying spaces. — Computational homotopy theory, particularly stable homotopy groups of spheres using the cutting edge technology of "topological modular forms". — Homology of the space of smooth loops on a manifold, endowed with the Chas-Sullivan intersection product.

Alexandru DIMCA. — **Sheaves in topology.** — Universitext. — Un vol. relié, $15,5 \times 24$, de XVI, 236 p. — ISBN 3-540-20665-5. — Prix: €39.95. — Springer, New York, 2004.

Constructible and perverse sheaves are the algebraic counterpart of the decomposition of a singular space into smooth manifolds, a great geometrical idea due to R. Thom and H. Whitney. These sheaves, generalizing the local systems that are so ubiquitous in mathematics, have powerful applications to the topology of such singular spaces (mainly algebraic and analytic complex varieties). This introduction to the subject can be regarded as a textbook on "modern algebraic topology", which treats the cohomology of spaces with sheaf coefficients (as opposed to the classical constant coefficient cohomology). The first five chapters introduce derived categories, direct and inverse images of sheaf complexes, Verdier duality, constructible and perverse sheaves, vanishing and characteristic cycles. They also discuss relations to D-modules and intersection cohomology. The final chapter applies this

powerful tool to the study of the topology of singularities, of polynomial functions and of hyperplane arrangements.

Topologie des variétés, analyse globale et analyse des variétés

Jonathan HILLMAN. — **Algebraic invariants of links.** — Series on knots and everything, vol. 32. — Un vol. relié, $16 \times 23,5$, de XII, 305 p. — ISBN 981-238-154-6. — Prix: £29.00. — World Scientific, Singapore, 2003.

This book is intended as a reference on links and on the invariants derived via algebraic topology from covering spaces of link exteriors. It emphasizes features of the multicomponent case not normally considered by knot theorists, such as longitudes, the homological complexity of many-variable Laurent polynomial rings, free coverings of homology boundary links, the lower central series as a source of invariants, nilpotent completion and algebraic closure of the link group, and disc links. Invariants of the types considered here play an essential role in many applications of knot theory to other areas of topology.

Joachim KOCK. — **Frobenius algebras and 2D topological quantum field theories.** — London Mathematical Society student texts, vol. 59. — Un vol. broché, $15,5 \times 23$, de XIII, 240 p. — ISBN 0-521-54031-3 (relié: 0-521-83267-5). — Prix: £22.99. (relié: £60.00). — Cambridge University Press, Cambridge, 2003.

This book describes a striking connection between topology and algebra, expressed by the theorem that 2D topological quantum field theories are the same as commutative Frobenius algebras. The precise formulation of the theorem and its proof is given in terms of monoidal categories, the main purpose of the book being to develop these concepts from an elementary level, and more generally to serve as an introduction to categorical viewpoints in mathematics. Rather than just proving the theorem, it is shown how the result fits into a more general pattern concerning universal monoidal categories for algebraic structures.

Jun O'HARA. — **Energy of knots and conformal geometry.** — Series on knots and everything, vol. 33. — Un vol. relié, $16 \times 23,5$, de XIV, 288 p. — ISBN 981-238-316-6. — Prix: £31.00. — World Scientific, Singapore, 2003.

Energy of knots is a theory that was introduced to create a “canonical configuration” of a knot — a beautiful knot which represents its knot type. This book introduces several kinds of energies, and studies the problem of whether or not there is a “canonical configuration” of a knot in each knot type. It also considers this problem in the context of conformal geometry. The energies presented in the book are defined geometrically. They measure the complexity of embeddings and have applications to physical knotting and unknotting through numerical experiments.

Probabilités et processus stochastiques

Loïc CHAUMONT, Marc YOR. — **Exercises in probability: a guided tour from measure theory to random processes, via conditioning.** — Cambridge series in statistical and probabilistic mathematics. — Un vol. broché, 18×26 , de XV, 236 p. — ISBN 0-521-82585-7. — Prix: £35.00. — Cambridge University Press, Cambridge, 2004.

Derived from extensive teaching experience in Paris, this book presents around 100 exercises in probability. The exercises cover measure theory and probability, independence and conditioning, Gaussian variables, distributional computations, convergence of random

variables, and random processes. For each exercise the authors have provided a detailed solution as well as references for preliminary and further reading. There are also many insightful notes that set the exercises in context. Students will find these exercises extremely useful for easing the transition between simple and complex probabilistic frameworks.

Elart VON COLLANI, (Editor). — **Defining the science of stochastics.** — Sigma series in stochastics, vol. 1. — Un vol. relié, 18×24,5 de xvii, 240 p. — ISBN 3-88538-301-2. — Prix: €30.00. — Heldermann Verlag, Lemgo, 2003.

The contributions to this volume are revised and updated versions of lectures delivered at the Symposium “Defining the Science of Stochastics”, which took place at Schloss Zeilitzheim, Germany, in October 2000. The authors reflect on the history and nature of statistical science and propose to establish “Stochastics” as an independent, mathematically based science, the subject of which is uncertainty generated by ignorance and randomness.

Evariste GINÉ, Christian HOUDRE, David NUALART, (Editors). — **Stochastic inequalities and applications.** — Progress in probability, vol. 56. — Un vol. relié, 16×23,5, de viii, 365 p. — ISBN 3-7643-2197-0. — Prix: SFr. 220.00. — Birkhäuser, Basel, 2004.

Concentration inequalities, which express the fact that certain complicated random variables are almost constant on almost the whole space, have proven of utmost importance in many areas of probability and statistics. This volume contains refined versions of these inequalities, and their relationship to entropy, transportation costs and geometry, along with applications in hypothesis testing and information theory, multilinear forms and U-statistics, Rademacher processes, moderate and large deviations, empirical processes and regression, Markov processes and queuing theory. Extensions of classical and basic moment inequalities to linear and multilinear forms in independent random variables and vectors, and new results on the rate of convergence in the central limit theorem, can be found here as well. The book also contains a sample of recent advances on several aspects of stochastic analysis such as diffusion processes, stochastic differential equations driven by fractional Brownian motion, Lyapunov exponents for stochastic differential equations with jumps, and Lévy processes.

Pierre PICCO, Jaime SAN MARTIN, (Editors). — **From classical to modern probability: CIMPA Summer School 2001.** — Progress in probability, vol. 54. — Un vol. relié, 16×23,5, de xvi, 219 p. — ISBN 3-7643-2169-5. — Prix: SFr. 138.00. — Birkhäuser, Basel, 2004.

This volume is based on the lecture notes of six courses delivered at a Cimpa Summer School in Temuco, Chile, in January 2001. Leading experts contribute with introductory articles covering a broad area in probability theory and its applications. Written at graduate level, the lectures touch the latest advances on each subject. — Asymptotics of the heat kernel in unbounded domains (P. Collet). — Spin systems with long range interactions (A. De Masi). — Nonlinear Dirichlet problem and nonlinear integration (C. Dellacherie). — First-passage percolation (H. Kesten). — Central limit theorem for Markov processes (C. Landim). — Stochastic orders and stopping times in Brownian motion (I. Meilijson).

Fred W. STEUTEL, Klaas VAN HARN. — **Infinite divisibility of probability distributions on the real line.** — Pure and applied mathematics, vol. 259. — Un vol. relié, 16×23,5, de x, 546 p. — ISBN 0-8247-0724-9. — Prix: US\$195.00. — Marcel Dekker, New York, 2004.

Fundamental to theoretical probability and valuable in such applications as financial, insurance, and biological modeling and deconvolution problems in mathematical physics, infinite divisibility has proven to be a very productive area of research. Reassessing classical theory and presenting new developments, this definitive, example-rich text focuses on divisibility with respect to convolution or addition of independent random variables. — *Contents:*

Introduction and overview. – Infinitely divisible distributions on the nonnegative integers. – Infinitely divisible distributions on the nonnegative reals. – Infinitely divisible distributions on the real line. – Self-decomposability and stability. – Infinite divisibility and mixtures. – Infinite divisibility in stochastic processes. – Appendices: Prerequisites from probability and analysis; selected well-known distributions.

David STIRZAKER. — **Elementary probability.** — Second edition. — Un vol. broché, 18×25, de XII, 524 p. — ISBN 0-521-53428-3 (relié: 0-521-83344-2). — Prix: £28.00 (relié: £65.00). — Cambridge University Press, Cambridge, 2004.

Now available in a fully revised and updated new edition, this well-established textbook provides a straightforward introduction to the theory of probability. The presentation is entertaining without any sacrifice of rigour; important notions are covered with the clarity that the subject demands. Topics covered include conditional probability, independence, discrete and continuous random variables, basic combinatorics, generating functions and limit theorems, and an introduction to Markov chains. This edition includes an elementary approach to martingales and the theory of Brownian motion, which supply the cornerstones for many topics in modern financial mathematics such as option and derivative pricing.

Kazuaki TAIRA. — **Semigroups, boundary value problems and Markov processes.** — Springer monographs in mathematics. — Un vol. relié, 17×24, de XI, 337 p. — ISBN 3-540-40651-4. — Prix: €79.95. — Springer, Berlin, 2003.

The purpose of this book is to provide a careful and accessible account of the subject along modern lines, as well as to discuss problems of current interest in the field. More precisely, this book is devoted to the functional-analytic approach to a class of degenerate boundary value problems for second-order elliptic integro-differential operators which includes as particular cases the Dirichlet and Robin problems. This class of boundary value problems provides a new example of analytic semigroups. As an application, we construct a strong Markov process corresponding to a diffusion phenomenon such that a Markovian particle moves both by jumps and continuously in the state space until it dies at the time when it reaches the set where the particle is definitely absorbed.

Statistique

Zehua CHEN, Zhidong BAI, Bimal K. SINHA. — **Ranked set sampling: theory and applications.** — Lecture notes in statistics, vol. 176. — Un vol. broché, 15,5×23,5, de XII, 224 p. — ISBN 0-387-40263-2. — Prix: €64.95. — Springer, New York, 2004.

This is the first book on the concept and applications of ranked set sampling. It provides a comprehensive review of the literature, and it includes many new results and novel applications. The mathematical rigor of the theoretical foundations makes it beneficial to researchers. The detailed description of various methods illustrated by real or simulated data makes it useful for scientists and practitioners in application areas such as agriculture, forestry, sociology, ecological and environmental science, and medical studies. It can serve as a reference book and as a textbook for a short course at the graduate level.

Lothar SACHS. — **Angewandte Statistik: Anwendung statistischer Methoden.** — Elfte, überarbeitete und aktualisierte Auflage. — Un vol. broché, 17×24, de XXXVII, 889 p. — ISBN 3-540-40555-0. — Prix: €49.95. — Springer, Berlin, 2003.

Die Anwendung statistischer Methoden wird heute durch den Einsatz von Computern bestimmt. Dieses Buch erläutert statistische Ansätze, ergänzt die Software und gibt leicht

fasslich, anschaulich und praxisnah Schülern, Studenten, Praktikern und Dozenten die notwendigen Details, um Daten zu gewinnen, zu beschreiben und zu beurteilen. Es dient zum lernen, Anwenden und Nachschlagen bei unterschiedlichen Vorkenntnissen und breitgestreuten Interessen in Schulen, Hochschulen und in der Praxis. Neben zahlreichen Hinweisen und Empfehlungen zur Planung und Auswertung von Studien, einer anschaulich und anwenderbezogenen Darstellung von Konzepten, Begriffen, Beziehungen, Fehlerquellen und Fallstricken, dienen Tips und Querverweise sowie ein sehr ausführliches und strukturiertes Sachverzeichnis mit einer Fülle erläuterter Stichworte auch zur Ergänzung von Statistik-Software-Handbüchern, insbesondere für Mediziner, Ingenieure und Naturwissenschaftler. Weiterführende Studien ermöglicht ein ausführliches Literaturverzeichnis.

Alexandre TSYBAKOV. — **Introduction à l'estimation non-paramétrique.** — Mathématiques et applications, vol. 41. — Un vol. broché, 15,5×23,5, de x, 175 p. — ISBN 3-540-40592-5. — Prix : €33.13. — Springer, Berlin, 2003.

La théorie de l'estimation non-paramétrique s'est développée considérablement ces deux dernières décennies, en se fixant pour objectif quelques thèmes principaux, en particulier, l'étude de l'optimalité des estimateurs et l'estimation adaptative. Ces deux thèmes occupent la place centrale dans le livre. Il s'agit de présenter, pour quelques modèles et exemples simples, les idées principales de l'estimation non-paramétrique. Quelques sujets abordés sont : les méthodes de noyaux, de projection et de polynômes locaux, vitesses optimales de convergence, le théorème de Pinsker, les inégalités d'oracle, l'adaptation au sens minimax. Un chapitre est consacré à l'exposition détaillée des différentes techniques de minoration du risque minimax.

Analyse numérique

C. T. KELLEY. — **Solving nonlinear equations with Newton's method.** — Fundamentals of algorithms. — Un vol. broché, 18×25,5, de xiii, 104 p. — ISBN 0-89871-546-6. — Prix : US\$39.00. — SIAM, Philadelphia, 2003.

This book on Newton's method is a user-oriented guide to algorithms and implementation. In just over 100 pages, it shows, via algorithms in pseudocode, in MATLAB, and with several examples, how one can choose an appropriate Newton-type method for a given problem, diagnose problems, and write an efficient solver or apply one written by others. It contains troubleshooting guides to the major algorithms, their most common failure modes, and the likely causes of failure. It also includes many worked-out examples (available on the SIAM website) in pseudocode and a collection of MATLAB codes, allowing readers to experiment with the algorithms easily and implement them in other languages. This book is intended to complement Kelley's larger book, *Iterative Methods for Solving Linear and Nonlinear Equations* (SIAM, 1995), which focuses on in-depth treatment of convergence theory but does not discuss the details of solving particular problems, implementation in any particular language, or evaluating a solver for a given problem.

Informatique

Laurent YOUNES. — **Invariance, déformations et reconnaissance de formes.** — Mathématiques & applications, vol. 44. — Un vol. broché, 15,5×23,5, de xvii, 248 p. — ISBN 3-540-40868-1. — Prix : €45.45. — Springer, Paris, 2004.

Cet ouvrage introduit un certain nombre de techniques disponibles pour la reconnaissance de formes planes, en mettant l'accent sur l'importance de la prise en compte des deux notions

essentielles que sont l'invariance et l'analyse des déformations. En conciliant autant qu'il se peut les aspects théoriques fondamentaux et les techniques algorithmiques réalistes, il revisite les différentes méthodes de représentations de formes, allant des représentations paramétriques invariantes aux axes médians, décrit sous un éclairage original un certain nombre de techniques de détection de formes, et développe des résultats récents sur l'analyse des déformations et la mise en correspondance de formes et d'images. Il est susceptible de servir à la fois de référence pour le chercheur et d'ouvrage d'introduction à la théorie pour l'étudiant de troisième cycle.

Mécanique quantique

M.J. ABLOWITZ, B. PRINARI, A.D. TRUBATCH. — **Discrete and continuous nonlinear Schrödinger systems.** — London Mathematical Society lecture note series, vol. 302. — Un vol. broché, 15×23, de ix, 257 p. — ISBN 0-521-53437-2. — Prix: £37.50. — Cambridge University Press, Cambridge, 2004.

During the past 30 years there have been important and far-reaching developments in the study of nonlinear waves and a class of nonlinear wave equations that arise frequently in applications. The wide interest in this field can be traced to the understanding of solitons and the associated development of a method of solutions termed the inverse scattering transform (IST). The IST technique applies to both continuous and discrete nonlinear Schrödinger (NLS) equations of scalar and vector type. The NLS equations arise in many important physical applications, such as nonlinear optics, fluid dynamics, and statistical physics. This book provides a thorough, self-contained presentation of the IST as applied to NLS systems. Detailed mathematical analysis of the scattering theory is presented, soliton solutions are obtained, and soliton interactions are analyzed. Many details presented in this book, including aspects of the scattering theory, solution methodology, soliton solutions, and vector-soliton interactions, are not available in the previously published literature.

Économie, recherche opérationnelle, jeux

Dominique de WERRA, Thomas M. LIEBLING, Jean-François HÊCHE. — **Recherche opérationnelle pour ingénieurs.** — Deux vol. brochés, 16×24, de respectivement, xvi, 385 p. et xvii, 410 p. — ISBN 2-88074-446-6 (vol. 1), 2-88074-459-8 (vol. 2). — Prix: SFr. 55.00 chaque volume. — Presses polytechniques et universitaires romandes, Lausanne, 2003.

Permettant la conception et l'entretien de systèmes logistiques et techniques toujours plus complexes, la recherche opérationnelle fait aujourd'hui partie du bagage essentiel à tout ingénieur. Avec un formalisme mathématique réduit, ces ouvrages offrent une introduction aux principaux outils de modélisation et de résolution des problèmes de recherche opérationnelle, ainsi qu'aux méthodes d'optimisation et de simulation. Les concepts introduits sont motivés par de nombreux exemples et exercices, illustrant diverses applications aux sciences de l'ingénieur et à la gestion. — *Vol. 1:* Convexité et optimisation linéaire. — Dualité. — Résolution du problème de programmation linéaire. — Compléments sur l'algorithme du simplexe. — Variations sur le simplexe. — Autres algorithmes pour la programmation linéaire. — Éléments de théorie des graphes. — La méthode du simplexe dans les réseaux. — Flot de valeur maximum. — Flots à coût minimum et flots compatibles. — Arbres optimaux et matroïdes. — Éléments d'optimisation non linéaire. — Quelques méthodes de programmation linéaire en nombres entiers. — Méthodes de points intérieurs. — Quelques problèmes d'ordonnancement.

— *Vol. 2*: Les chaînes de Markov à temps discret. — Les chaînes de Markov à temps continu. — Les files d'attente et les réseaux de files d'attente. — La programmation dynamique. — Les processus de décisions markoviens. — Les modèles de gestion de stocks. — Notions de simulation. — Nombres aléatoires et pseudo-aléatoires.

Biologie et sciences du comportement

Elizabeth S. ALLMAN, John A. RHODES. — **Mathematical models in biology: an introduction.** — Un vol. broché, 15×23, de xiii, 370 p. — ISBN 0-521-52586-1 (relié: 0-521-81980-6) — Prix: £24.99 (relié: £65.00). — Cambridge University Press, Cambridge, 2004.

This introductory textbook on mathematical biology focuses on discrete models across a variety of biological subdisciplines. Biological topics treated include linear and nonlinear models of populations, Markov models of molecular evolution, phylogenetic tree construction, genetics, and infectious disease models. The coverage of models of molecular evolution and phylogenetic tree construction from DNA sequence data is unique among books at this level. Computer investigations with MATLAB are incorporated throughout, in both exercises and more extensive projects, to give readers hands-on experience with the mathematical models developed. MATLAB programs accompany the text. Mathematical tools, such as matrix algebra, eigenvector analysis, and basic probability, are motivated by biological models and given self-contained developments, so that mathematical prerequisites are minimal.

Hans FÖLLMER, François MATHEY, Herbert W. ROESKY, Jürgen TROE, (Organizing Committee). — **Chemistry and mathematics: two scientific languages of the 21st century.** — Nova Acta Leopoldina, Abhandlungen der Deutschen Akademie der Naturforscher Leopoldina, Neue Folge, Nummer 330, Band 88. — Un vol. broché, 17×24, de xii, 160 p. — ISBN 3-8047-2038-2. — Prix: €28.80. — Wissenschaftliche Verlagsgesellschaft, Stuttgart, 2003.

Herbert W. Roesky: Introduction. — Guy Ourisson: Chemistry, an ideographic language. — Jean-Paul Collin, Christiane Dietrich-Buchecker, Pablo Gaviña, Maria Consuelo Jimenez-Molero, and Jean-Pierre Sauvage: Transition metal-based machines and motors at the molecular level. — Olaf Delgado-Friedrichs: Virtual Crystallography. — Peter A. Deuflhard: A comparison of related concepts in computational chemistry and mathematics. — Jerzy Haber: The essence of chemical thinking beyond mathematical equations. — Jürgen Warnatz: Analysis of chemical reaction systems – What are mathematics able to do, how far has chemistry to help? — Sir John Meurig Thomas: Poetic Suggestion in chemical science. — Jürgen Wolfrum: Combustion: from mathematical models to practical devices.

Systèmes, contrôle

Martin J. CORLESS, Arthur E. FRAZHO. — **Linear systems and control: an operator perspective.** — Pure and applied mathematics, vol. 254. — Un vol. relié, 16×24, de xi, 338 p. — ISBN 0-8247-0729-X. — Prix: US\$165.00. — Marcel Dekker, New York, 2003.

Based largely on state space models, this text/reference utilizes fundamental linear algebra and operator techniques to develop classical modern results in linear systems analysis and control design. The book presents stability and performance results for linear systems...

provides a geometric perspective on controllability and observability... develops state space realizations of transfer functions... studies stabilizability and detectability... constructs state feedback controllers and asymptotic state estimators... covers the linear quadratic regulator problem in detail... offers an introduction to H-infinity control... and provides results on Hamiltonian matrices and Riccati equations.

Information, communication, circuits

San LING and Chaoping XING. — **Coding theory: a first course.** — Un vol. broché, 17×24,5, de XII, 222 p. — ISBN 0-521-52923-9 (relié: 0-521-82191-6). — Prix: £23.95 (relié: £65.00). — Cambridge University Press, Cambridge, 2004.

Coding theory is concerned with successfully transmitting data through a noisy channel and correcting errors in corrupted messages. It is of central importance for many applications in computer science or engineering. This book gives a comprehensive introduction to coding theory whilst only assuming basic linear algebra. It contains a detailed and rigorous introduction to the theory of block codes and moves on to more advanced topics such as BCH codes, Goppa codes and Sudan's algorithm for list decoding. The issues of bounds and decoding, essential to the design of good codes, feature prominently. This book contains a wealth of examples and exercises.

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BULLETIN BIBLIOGRAPHIQUE

Généralités

Richard BEALS. — **Analysis: an introduction.** — Un vol. broché, $17,5 \times 25,5$, de IX, 261 p. — ISBN 0-521-60047-2 (relié: 0-521-84072-4). — Prix: £24.99 (relié: £50.00). — Cambridge University Press, Cambridge, 2004.

This self-contained text, suitable for advanced undergraduates, provides an extensive introduction to mathematical analysis, from the fundamentals to more advanced material. It begins with the properties of the real numbers and continues with a rigorous treatment of sequences, series, metric spaces, and calculus in one variable. Further subjects include Lebesgue measure and integration on the line, Fourier analysis, and differential equations. In addition to this core material, the book includes a number of interesting applications of the subject matter to areas both within and outside of the field of mathematics. The aim throughout is to strike a balance between being too austere or too sketchy, and being so detailed as to obscure the essential ideas. A large number of examples and nearly 500 exercises allow the reader to test understanding and practice mathematical exposition, and they provide a window into further topics.

Elwyn R. BERLEKAMP, John H. CONWAY, Richard K. GUY. — **Winning ways for your mathematical plays, vol. 4.** — Second edition. — Un vol. broché, $18,5 \times 23,5$, de XVI, pp. 805-1004. — ISBN 1-56881-144-6. — Prix: US\$39.00. — A.K. Peters, Wellesley, Massachusetts, 2004.

In the quarter of a century since three mathematicians and game theorists collaborated to create *Winning Ways for Your Mathematical Plays*, the book has become the definitive work on the subject of mathematical games. Now carefully revised and broken down into four volumes to accommodate new developments, the second edition retains the original's wealth of wit and wisdom. The authors' insightful strategies, blended with their witty and irreverent style, make reading a profitable pleasure. In volume 4, the authors present a Diamond of a find, covering one player games such as Solitaire.

Jonathan BORWEIN, David BAILEY, Roland GIRGENSOHN. — **Experimentation in mathematics: computational paths to discovery.** — Un vol. broché, 16×24 , de x, 357 p. — ISBN 1-56881-136-5. — Prix: US\$49.00. — A K Peters, Wellesley, Massachusetts, 2004.

This book and its companion, *Mathematics by Experiment*, are testaments to a paradigm shift in the making. In *Experimentation in Mathematics*, the authors address the role of

computer-based experimental research in the formulation of new hypotheses and the discovery of new results. Drawing on their own work and that of others, the authors not only explain experimental mathematics in a lively, surprisingly accessible fashion, but give many engaging examples of the “new paradigm” in action.

I.N. BRONSHTEIN, K.A. SEMENDYAYEV, G. MUSIOL, H. MUEHLIG. — **Handbook of mathematics.** — 4th edition. — Un vol. broché, 14×21, de XLII, 1157 p. — ISBN 3-540-43491-7. — Prix: €59.95. — Springer, Berlin, 2004.

This guidebook to mathematics contains in handbook form the fundamental working knowledge of mathematics which is needed as an everyday guide for working scientists and engineers, as well as for students. Easy to understand, and convenient to use, this guidebook gives concisely the information necessary to evaluate most problems which occur in concrete applications. For the 4th edition, the concept of the book has been completely re-arranged. The new emphasis is on those fields of mathematics that became more important for the formulation and modelling of technical and natural processes, namely numerical mathematics, probability theory and statistics, as well as information processing.

Yves CAUMEL. — **Cours d'analyse fonctionnelle et complexe: pour les élèves ingénieurs et les étudiants des filières mathématiques de l'Université.** — Un vol. broché, 17×24, de 238 p. — ISBN 2-85428-563-8. — Prix: €24.00. — Cépaduès-Editions, Toulouse, 2003.

Adepté d'une pédagogie constructive et motivante, évitant autant que faire se peut l'inefficace linéarité de l'exposé déductif, l'auteur a semé le parcours du néophyte d'appels à l'intuition géométrique et d'applications aux sciences physiques, d'intermèdes historiques ou épistémologiques, ainsi que de nombreux exercices et problèmes corrigés. Cet ouvrage est composé de six chapitres: les quatre premiers sont dédiés à l'analyse fonctionnelle et harmonique, les deux autres exposent la théorie des fonctions holomorphes. Le premier chapitre est un exposé de la théorie ensembliste de la mesure et de l'intégration. Le deuxième chapitre présente de façon détaillée la théorie des espaces hilbertiens et ses applications à l'approximation fonctionnelle dans les espaces L^2 . Le troisième chapitre concerne l'analyse et la synthèse harmonique des fonctions réelles en séries et transformées de Fourier. Le chapitre quatre est une introduction à la théorie des distributions, motivée et illustrée par la théorie du signal. La théorie des fonctions holomorphes et ses applications incontournables, transformation conforme, transformée en Z et calcul de résidus, fait l'objet des deux derniers chapitres.

Laurent DECREUSEFOND, Alain MARUANI. — **Mathématiques, informatique, physique: au fil des TIPE.** — Scopos, vol. 19. — Un vol. broché, 15,5×23,5, de XIII, 267 p. — ISBN 2-287-22305-3. — Prix: €33.13. — Springer, Berlin, 2004.

Introduits en 1997, les Travaux d'Initiative Personnelle Encadrés (TIPE) concernent chaque année quinze mille élèves des Classes préparatoires aux Grandes Ecoles (CPGE). Cette épreuve scientifique orale valorise l'aptitude à la communication et au dialogue, le sens de l'initiative et l'esprit critique. Cet ouvrage présente neuf dossiers de mathématiques, physique ou d'informatique proposés au concours. Chaque sujet est accompagné de remarques générales, d'un commentaire, d'une suggestion de plan, de questions qu'un jury aurait pu poser et d'un développement remplaçant le thème du dossier dans son contexte scientifique. Les auteurs espèrent ainsi, non seulement aider les étudiants de CPEG dans leur préparation de l'épreuve, mais encore faire œuvre utile pour les enseignants.

Jacques DOUCHET. — **Analyse: recueil d'exercices et aide-mémoire, vol. 2.** — Enseignement des mathématiques. — Un vol. broché, 16×24, de VIII, 250 p. — ISBN 2-88074-570-5. — Prix: SFr. 42.00. — Presses polytechniques et universitaires romandes, Lausanne, 2004.

Ce recueil de 462 exercices est principalement destiné aux étudiants du premier cycle universitaire qui suivent un cours de calcul différentiel et intégral sur les fonctions réelles de plusieurs variables réelles, mais il s'adresse aussi à tous ceux qui souhaitent parfaire leurs connaissances dans l'un ou l'autre des sujets traités. Cet ouvrage complète le volume 1 qui traite des fonctions réelles d'une variable réelle. Il contient 4 chapitres divisés chacun en 2 parties. La première partie est un rappel de toutes les principales définitions et des résultats essentiels à la connaissance de la matière traitée. Les propositions sont énoncées avec précision mais sans démonstration. La deuxième partie est constituée d'un recueil d'exercices accompagnés de leurs solutions.

Steven R. FINCH. — **Mathematical constants.** — Encyclopedia of mathematics and its applications, vol. 94. — Un vol. relié, 16×24,5, de XIX, 602 p. — ISBN 0-521-81805-2. — Prix: £95.00. — Cambridge University Press, Cambridge, 2003.

How do constants arise and why are they important? Here the author provides 136 essays, each devoted to a mathematical constant or a class of constants, from the well known to the highly exotic. Topics covered include the statistics of continued fractions, chaos in nonlinear systems, prime numbers, sum-free sets, isoperimetric problems, approximation theory, self-avoiding walks and the Ising model (from statistical physics), binary and digital search trees (from theoretical computer science), the Prouhet-Thue-Morse sequence, complex analysis, geometric probability, and the traveling salesman problem. This book will be helpful both to readers seeking information about a specific constant and to readers who desire a panoramic view of all constants coming from a particular field, for example, combinatorial enumeration or geometric optimization. Unsolved problems appear virtually everywhere as well. This is an outstanding scholarly attempt to bring together all significant mathematical constants in one place.

Kristine K. FOWLER, (Editor). — **Using the mathematics literature.** — Un vol. relié, 16×24, de VII, 389 p. — ISBN 0-8247-5035-7. — Prix: US\$165.00. — Marcel Dekker, New York, 2004.

Helping mathematicians easily locate resources in any format in the mathematics literature, this reference serves as a reader-friendly guide to every basic tool and skill required in the mathematical library – listing a wide range of standard texts, important journals, review articles, newsgroups, and valuable Internet and database tools for every major subfield in mathematics. Using the Mathematics Literature assists students in their search for interactive aids, software, tutorials, definitions, and clear samples of mathematical writing... leads mathematicians to new research, applications, results, and techniques... details convenient methods of access to primary literature sources... and describes techniques to find articles in indexes, trace literature through time, and maneuver through an abundance of Internet sources.

Mariano GIAQUINTA, Giuseppe MODICA. — **Mathematical analysis: approximation and discrete processes.** — Un vol. relié, 16×24, de XII, 388 p. — ISBN 0-8176-4313-3. — Prix: SFr. 170.00. — Birkhäuser, Boston, 2004.

A key feature of this lively yet rigorous and systematic exposition is the historical accounts of ideas and methods pertaining to the relevant topics. Most interesting and useful

are the connections developed between analysis and other mathematical disciplines, in this case, numerical analysis and probability theory. The text is divided into two parts: the first examines the systems of real and complex numbers and deals with the notion of sequences in this context. The second part is dedicated to discrete processes starting with a study of the processes of infinite summation both in the case of numerical series and of power series. The volume closes with an introductory chapter on the study of discrete dynamical systems and a summary of mathematicians and other scientists referenced in the work.

Georges GIRAUD, Jean-Paul DUFOUR. — **Mathématiques et résolution des équations aux dérivées partielles classiques.** — Un vol broché, 17×24 , de 151 p. — ISBN 2-85428-606-5. — Prix : €20.00. — Cépaduès-Editions, Toulouse, 2003.

Séries de Fourier, transformées de Fourier, ces outils très utilisés en physique sont ici appliqués à la résolution d'équations aux dérivées partielles telles que l'équation des ondes à une dimension, l'équation de la chaleur, l'équation de Laplace. Les premiers chapitres rappellent les connaissances devant être acquises par un étudiant du premier cycle s'orientant vers les mathématiques ou la physique (séries numériques, séries de fonctions, séries entières, séries de Fourier, transformées de Fourier), particulièrement dans le deuxième chapitre un complément sur les matrices (Jordanisation) est fourni afin de montrer l'utilisation de l'algèbre linéaire dans les situations physiques se traduisant par un système d'équations différentielles. L'avant-dernier chapitre prouve l'utilité de ces notions pour la résolution d'équations aux dérivées partielles avec des démonstrations rigoureuses de l'unicité de la solution. Quant au dernier chapitre sur les fonctions complexes, il fournit des méthodes supplémentaires de calcul d'intégrales.

Kiran S. KEDLAYA, Bjorn POONEN, Ravi VAKIL. — **The William Lowell Putnam Mathematical Competition 1985-2000: problems, solutions, and commentary.** — MAA problem books series. — Un vol. relié, $18,5 \times 26$, de xiv, 336 p. — ISBN 0-88385-807-X. — Prix : £30.00. — The Mathematical Association of America, distributed by Cambridge University Press, Cambridge, 2003.

The William Lowell Putnam Mathematical Competition is the premier mathematical competition at the undergraduate level in North America. This volume is unlike the first two Putnam volumes, in that it places the problems in the context of important mathematical themes. The authors highlight connections to other problems, to the curriculum, and to more advanced topics. The best problems contain kernels of sophisticated ideas related to important current research, and yet the problems are accessible to undergraduates. The heart of the book is in the solutions, which have been compiled through extensive research. The authors present the best solutions from the American Mathematical Monthly, Mathematics Magazine, past competitors, and many problem enthusiasts. Often the authors have simplified these solutions, or have developed new solutions of their own.

John DE PILLIS. — **777 mathematical conversation starters.** — Spectrum series. — Un vol. relié, 15×23 , de xvi, 344 p. — ISBN 0-88385-540-2. — Prix : £23.99. — The Mathematical Association of America, distributed by Cambridge University Press, Cambridge, 2004.

This book shows that there are few degrees of separation between mathematics and topics that provoke interesting conversations. The topics presented in this unique book are accessible to mathematicians and non-mathematicians alike. They include thought-provoking

conversation starters such as: the value of fame; why language matters; the anatomy of thought; how we know what we know; how the Pythagorean theorem (with very little physics) shows that Einstein was correct about time dilation and distance contraction; and how mathematics produces intuition-defying examples. The format is unique too. Topics (conversation starters) are numbered, extensively cross-referenced, and divided into small digestible units. Many are illustrated with one-hundred fifty original cartoons and illustrations done by the author. The book may be used in a conventional linear way or the reader may decide to change direction and follow the cross-referencing.

Patrice ROVIRA. — **Mathématiques générales: pour 1^{er} cycle universitaire et formation continue.** — Un vol. broché, 17×24, de 464 p. — ISBN 2-85428-628-6. — Prix: €26.00. — Cépaduès-Editions, Toulouse, 2003.

Cet ouvrage s'adresse tout particulièrement aux étudiants scientifiques du 1^{er} cycle d'université et aux élèves d'école d'ingénieur, de la formation continue ou d'IUT. Après une présentation à la fois rigoureuse et rapide des notions fondamentales dans les chapitres 1 et 2, afin de se familiariser avec le vocabulaire mathématique, nous entrons progressivement dans des notions plus complexes. L'auteur a conçu un livre compagnon, présentant les notions essentielles le plus clairement possible, agrémentées d'exemples, de remarques et d'analogies afin d'en faciliter la compréhension. Les démonstrations qui y figurent sont importantes d'un point de vue pédagogique, et pour un entraînement à la rigueur mathématique.

Histoire

Lennart BERGGREN, Jonathan BORWEIN, Peter BORWEIN. — **Pi: a source book.** — 3rd edition. — Un vol. relié, 18,5×26, de XIX, 310 p. — ISBN 0-387-20571-3. — Prix: €79.95. — Springer, New York, 2004.

This book documents the history of pi from the dawn of mathematical time to the present. One of the beauties of the literature on pi is that it allows for the inclusion of very modern, yet accessible, mathematics. The articles on pi collected herein include selections from the mathematical and computational literature over four millennia, a variety of historical studies on the cultural significance of the number, and an assortment of anecdotal, fanciful, and simply amusing pieces. For this new edition, the authors have updated the original material while adding new material of historical and cultural interest. There is a substantial exposition of the recent history of the computation of digits of pi, a discussion of the normality of the distribution of the digits, new translation of works by Viète and Huygens, as well as Kaplansky's never-before-published "A Song about Pi".

G. Waldo DUNNINGTON. — **Carl Friedrich Gauss: titan of science.** — With additional material by Jeremy Gray and Fritz-Egbert Dohse. — Un vol. relié, 14,5×21, de XXIX, 537 p. — ISBN 0-88385-547-X. — Prix: £30.00. — The Mathematical Association of America, 2004, distributed by Cambridge University Press, Cambridge.

This biography of Gauss, by far the most comprehensive in English, is the work of a professor of German, G. Waldo Dunnington, who devoted most of his scholarly career to studying the life of Germany's greatest mathematician. Long out-of-print and almost impossible to find on the used book market, this valuable piece of scholarship is being reissued in an augmented form with introductory remarks, an expanded and updated bibliography, and a commentary on Gauss's mathematical diary, by the eminent British

mathematical historian Jeremy Gray. Also included are personal reminiscences about Dunnington himself, by Fritz-Egbert Dohse.

Jacques SESIANO. — **Les carrés magiques dans les pays islamiques.** — Un vol. broché, 16×24, de xiii, 277 p. — ISBN 2-88074-571-3. — Prix: SFr. 58.00. — Presses polytechniques et universitaires romandes, Lausanne, 2004.

L'une des contributions scientifiques les plus originales du monde musulman est sans doute le développement de méthodes générales de construction des carrés magiques, permettant donc de remplir un carré ayant un nombre carré de cases par une suite de nombres naturels différents en telle sorte que la somme dans chacune des lignes et des colonnes, ainsi que dans chacune des deux diagonales principales, soit la même. L'invention de ces méthodes peut être suivie dans le temps. Deux textes du Xe siècle, les plus anciens que l'on connaisse sur ce sujet, enseignent des méthodes particulières et quelques méthodes générales. Les textes du XIe siècle, eux, montrent que l'on savait remplir des carrés de n'importe quelle grandeur, en introduisant parfois même des conditions supplémentaires de magie. Durant les siècles suivants, ces méthodes anciennes sont perfectionnées, mais on remarque aussi l'accroissement du nombre de textes destinés à expliquer l'usage magique de carrés particuliers. Ce sont de tels textes qui parviendront, par l'Espagne, à l'Europe de la fin du Moyen Âge. Cela explique l'origine de la dénomination de «carré magique», alors que la dénomination arabe originelle signifiait «arrangement harmonieux des nombres».

Logique et fondements

Thomas EHRHARD, Jean-Yves GIRARD, Paul RUET, Philip SCOTT, (Editors). — **Linear logic in computer science.** — London Mathematical Society lecture note series, vol. 316. — Un vol. broché, 15,5×23, de x, 381 p. — ISBN 0-521-60857-0. — Prix: £40.00. — Cambridge University Press, Cambridge, 2004.

Linear logic is a branch of proof theory that provides refined tools for the study of the computational aspects of proofs. These tools include a duality-based categorical semantics, an intrinsic graphical representation of proofs, the introduction of well-behaved non-commutative logical connectives, and the concepts of polarity and focalisation. These various aspects are illustrated here through introductory tutorials as well as more specialised contributions, with a particular emphasis on applications to computer science: denotational semantics, lambda-calculus, logic programming and concurrency theory. The volume is rounded off by two invited contributions on new topics rooted in recent developments of linear logic.

Michael HUTH, Mark RYAN. — **Logic in computer science: modelling and reasoning about systems.** — Un vol. broché, de xiv, 427 p. — ISBN 0-521-54310-X. — Prix: £30.00. — Cambridge University Press, Cambridge, 2004.

The second edition of this successful textbook addresses both those requirements, by continuing to provide an introduction to formal reasoning that is both relevant to the needs of modern computer science and rigorous enough for practical application. The presentation is clear and simple, with core material being described early in the book, and further technicalities introduced only where they are needed by the applications. A key feature is the full exposition of model-checking, and the new edition supports the most up-to-date versions of the tools NuSMV and Alloy. Improvements to the first edition have been made throughout, with extra and expanded sections on linear-time temporal logic model checking, SAT solvers,

second-order logic, the Alloy specification tool, and programming by contract. The coverage of model-checking has been substantially updated. Further exercises have been added.

Godehard LINK, (Editor). — **One hundred years of Russell's paradox: mathematics, logic, philosophy.** — de Gruyter Series in Logic and Its Applications, vol. 6. — Un vol. relié, $17,5 \times 24,5$, de ix, 662 p. — ISBN 3-11-017438-3. — Prix: €157.01. — Walter de Gruyter, Berlin, 2004.

The papers collected in this volume represent the main body of research arising from the International Munich Centenary Conference in 2001, which commemorated the discovery of the famous Russell Paradox a hundred years ago. The 31 contributions and the introductory essay by the editor were (with two exceptions) all originally written for the volume. The volume serves a twofold purpose, historical and systematic. One focus is on Bertrand Russell's logic and logical philosophy, taking into account the rich sources of the Russell Archives, many of which have become available only recently. The second equally important aim is to present original research in the broad range of foundational studies that draws on both current conceptions and recent technical advances in the above-mentioned fields. The volume contributes thereby to the well-established body of mathematical philosophy initiated to a large extent by Russell's work.

Théorie des ensembles

Krzysztof CIESIELSKI, Janusz PAWLIKOWSKI. — **The covering property axiom, CPA: a combinatorial core of the iterated perfect set model.** — Cambridge tracts in mathematics, vol. 164. — Un vol. relié, $15,5 \times 23,5$, de xxi, 174 p. — ISBN 0-521-83920-3. — Prix: £40.00. — Cambridge University Press, Cambridge, 2004.

The authors formulate and explore a new axiom of set theory, CPA, the Covering Property Axiom. CPA is consistent with the usual ZFC axioms; indeed, it is true in the iterated Sacks model and actually captures the combinatorial core of this model. A plethora of results known to be true in the Sacks model easily follow from CPA. Replacing iterated forcing arguments with deductions from CPA simplifies proofs, provides deeper insight, and leads to new results. One may say that CPA is similar in nature to Martin's axiom, as both capture the essence of the models of ZFC in which they hold. The exposition is self-contained, and there are natural applications to real analysis and topology. Researchers who use set theory in their work will find much of interest in this book.

Analyse combinatoire

DRAGOŠ CVETKOVIČ, PETER ROWLINSON, SLOBODAN SIMIČ. — **Spectral generalizations in line graphs: on graphs with least eigenvalue -2** — London Mathematical Society lecture note series, vol. 314. — Un vol. broché, $15,5 \times 23$, de xi, 298 p. — ISBN 0-521-83663-8. — Prix: £35.00. — Cambridge University Press, Cambridge, 2004.

Line graphs have the property that their least eigenvalue is greater than or equal to -2 a property shared by generalized line graphs and a finite number of so-called exceptional graphs. This book deals with all these families of graphs in the context of their spectral properties. The authors discuss the three principal techniques that have been employed, namely "forbidden subgraphs", "root systems" and "star complements". They bring together

the major results in the area, including the recent construction of all the maximal exceptional graphs. Technical descriptions of these graphs are included in the appendices, while the bibliography provides more than 250 references.

Martin Charles GOLUMBIC, Ann N. TRENK. — **Tolerance graphs.** — Cambridge studies in advanced mathematics, vol. 89. — Un vol. relié, 16×23,5, de xii, 265 p. — ISBN 0-521-82758-2. — Prix: £40.00. — Cambridge University Press, Cambridge, 2004.

The study of algorithmic graph theory and structured families of graphs is an important branch of discrete mathematics. It finds numerous applications, from data transmission through networks to efficiently scheduling aircraft and crews, as well as contributing to breakthroughs in genetic analysis and studies of the brain. Especially important have been the theory and applications of new intersection graph models such as generalizations of permutation graphs and interval graphs. One of these is the study of tolerance graphs and tolerance orders. This book contains the first thorough study of tolerance graphs and related topics, indeed the authors have included proofs of major results previously unpublished in book form.

Jiří MATOUSEK, Jaroslav NESETRIL. — **Introduction aux mathématiques discrètes.** — Traduit de l'anglais par Delphine Hachez. — Collection IRIS. — Un vol. broché, 15,5×23,5, de xix, 451 p. — ISBN 2-287-20010-X. — Prix: €42.61. — Springer, Paris, 2004.

Cet ouvrage propose une initiation simple et complète aux fondements des mathématiques discrètes. Il encourage une approche active de la matière, fondée sur la résolution de nombreux exercices, et le style utilisé pour la rédaction ne peut que stimuler l'intérêt du lecteur pour les mathématiques. L'exposé aborde des thèmes aussi variés que la combinatoire, la théorie des graphes, les méthodes probabilistes élémentaires, les plans projectifs finis, les applications combinatoires de l'algèbre linéaire et de l'analyse ainsi que les fonctions génératrices. Les lecteurs apprécieront les quelques deux cents figures et quatre cents exercices qui illustrent le propos.

Stephen B. MAURER, Anthony RALSTON. — **Discrete algorithmic mathematics.** — Third edition. — Un vol. relié, de 19,5×25, de xxviii, 772 p. — ISBN 1-56881-166-7. — Prix: US\$88.00. — A. K. Peters, Wellesley, Massachusetts, 2004.

Thoroughly revised for a one-semester course, this well-known and highly regarded book is an outstanding text for undergraduate discrete mathematics. It has been updated with new or extended discussions of order notation, generating functions, chaos, aspects of statistics, and computational biology. Written in a lively, clear style that talks to the reader, the book is unique for its emphasis on algorithmics and the inductive and recursive paradigms as central mathematical themes. It includes a broad variety of applications not just to mathematics and computer science, but to natural and social science as well.

Théorie des nombres

Yan BUGEAUD. — **Approximation by algebraic numbers.** — Cambridge tracts in mathematics, vol. 160. — Un vol. relié, 16×23,5, de xv, 274 p. — ISBN 0-521-82329-3. — Prix: £40.00. — Cambridge University Press, Cambridge, 2004.

Algebraic numbers can approximate, and hence be used to classify, any real number. The author gathers together here results about such approximations and classifications. Written for

a broad audience, the book is accessible and self-contained, with complete and detailed proofs. Starting from continued fractions and Khintchine's theorem, Bugeaud introduces a variety of techniques, ranging from explicit constructions to metric number theory, including the theory of Hausdorff dimension. So armed, the reader is led to such celebrated advanced results as the proof of Mahler's conjecture on S -numbers, the Jarnik-Besicovitch theorem, and the existence of T -numbers. Brief consideration is given both to the p -adic and the formal power series cases. Thus the book can be used for graduate courses on Diophantine approximation (some 40 exercises are supplied), or as an introduction for non experts. Specialists will appreciate the collection of over 50 open problems and the rich and comprehensive list of more than 600 references.

John CREMONA, Joan-Carles LARIO, Jordi QUER, Kenneth RIBET, (Editors). — **Modular curves and Abelian varieties.** — Progress in mathematics, vol. 224. — Un vol. relié, 16×24 , de VIII, 289 p. — ISBN 3-7643-6586-2. — Prix: SFr. 148.00. — Birkhäuser, Basel, 2004.

This book presents lectures from a Conference on Modular Curves and Abelian Varieties that was held in July, 2002, at the Centre de Recerca Matemàtica (Bellaterra, Barcelona). It contains seventeen articles about Galois representations, modular forms, modular curves, and modular Abelian varieties – subjects that have played a central role in the development of number theory and arithmetic geometry during the last fifty years. The emphasis lies on the conjectural generalization of the Shimura-Taniyama conjecture to elliptic curves over number fields other than the field of rational numbers (elliptic \mathbf{Q} -curves) and on Abelian varieties of dimension larger than 1 (Abelian varieties of GL_2 -type). The book also includes several key articles in the subject that do not correspond to conference lectures.

Henri DARMON, Shou-Wu ZHANG, (Editors). — **Heegner points and Rankin L -series.** — Mathematical Sciences Research Institute publications, vol. 49. — Un vol. relié, 16×24 , de XIII, 367 p. — ISBN 0-521-83659-X. — Prix: £45.00. — Cambridge University Press, Cambridge, 2004.

The seminal formula of Gross and Zagier relating heights of Heegner points to derivatives of the associated Rankin L -series has led to many generalizations and extensions in a variety of different directions, spawning a fertile area of study that remains active to this day. This volume, based on a Workshop on Special Values of Rankin L -series held at the MSRI in December 2001, is a collection of articles written by many of the leading contributors in the field, having the Gross-Zagier formula and its avatars as a common unifying theme. It serves as a valuable reference for mathematicians wishing to become better acquainted with the theory of complex multiplication, automorphic forms, the Rankin-Selberg method, arithmetic intersection theory, Iwasawa theory, and other topics related to the Gross-Zagier formula.

Haruso HIDA. — **p -Adic automorphic forms on Shimura varieties.** — Springer Monographs in Mathematics. — Un vol. relié, 16×24 , de XI, 390 p. — ISBN 0-387-20711-2. — Prix: €89.95. — Springer, New York, 2004.

This book covers the following three topics: an elementary construction of Shimura varieties as moduli of abelian schemes; p -adic deformation theory of automorphic forms on Shimura varieties; a simple proof of irreducibility of the generalized Igusa tower over the Shimura variety. The book starts with a detailed study of elliptic and Hilbert modular forms and reaches to the forefront of research of Shimura varieties associated with general classical

groups. The method of constructing p -adic analytic families and the proof of irreducibility was recently discovered by the author. The area covered in this book is now a focal point of research worldwide with many far-reaching applications that have led to solutions of longstanding problems and conjectures. Specifically, the use of p -adic elliptic and Hilbert modular forms have proven essential in recent breakthroughs in number theory.

Bjorn POONEN, Yuri TSCHINKEL, (editors). — **Arithmetic of higher-dimensional algebraic varieties.** — Progress in mathematics, vol. 226. — Un vol. relié, 16×24 , de xvi, 287 p. — ISBN 0-8176-3259-X. — Prix: SFr. 118.00 — Birkhäuser, Basel, 2004.

One of the great successes of twentieth century mathematics has been the remarkable qualitative understanding of rational and integral points on curves, gleaned in part through the theorems of Mordell, Weil, Siegel, and Faltings. It has become clear that the study of rational and integral points has deep connections to other branches of mathematics: complex algebraic geometry, Galois and étale cohomology, transcendence theory and diophantine approximation, harmonic analysis, automorphic forms, and analytic number theory. This text, which focuses on higher dimensional varieties, provides precisely such an interdisciplinary view of the subject. It is a digest of research and survey papers by leading specialists; the book documents current knowledge in higher-dimensional arithmetic and gives indications for future research. It will be valuable not only to practitioners in the field, but to a wide audience of mathematicians and graduate students with an interest in arithmetic geometry.

Miles REID, Alexai SKOROBOGATOV, (Editor). — **Number theory and algebraic geometry: to Peter Swinnerton-Dyer on his 75th birthday.** — London Mathematical Society lecture note series, vol. 303. — Un vol. broché, 15×23 , de v, 300 p. — ISBN 0-521-54518-8. — Prix: £35.00. — Cambridge University Press, Cambridge, 2004.

This volume provides contemporary insight into several subjects in which Sir Peter Swinnerton-Dyer's influence has been notable, and is dedicated to him on his 75th birthday. The opening section reviews some of his many remarkable contributions to mathematics and other fields. The remaining articles come from leading researchers in number theory and algebraic geometry. The topics treated include: rational points on algebraic varieties, the Hasse principle, Shafarevich-Tate groups of elliptic curves and motives, Zagier's conjectures, descent and zero-cycles, Diophantine approximation, and Abelian and Fano varieties.

Géométrie algébrique

Alan ADOLPHSON, Francesco BALDASSARRI, Pierre BERTHELOT, Nicholas KATZ, and François LOESER, (Editors). — **Geometric aspects of Dwork theory.** — 2 vol. reliés, $18 \times 24,5$, de 1129 p. pour l'ensemble des vol. — ISBN 3-11-017478-2 — Prix: €306.54. — Walter de Gruyter, Berlin, 2004.

This two-volume book collects the lectures given during the three months cycle of lectures held in Northern Italy between May and July of 2001 to commemorate Professor Bernard Dwork (1923-1998). It presents a wide-ranging overview of some of the most active areas of contemporary research in arithmetic algebraic geometry, with special emphasis on the geometric applications of the p -adic analytic techniques originating in Dwork's work, their connection to various recent cohomology theories and to modular forms. The two volumes

contain both important new research and illuminating survey articles written by leading experts in the field. The book will provide an indispensable resource for all those wishing to approach the frontiers of research in arithmetic algebraic geometry.

János KOLLÁR, Karen E. SMITH, Alessio CORTI. — **Rational and nearly rational varieties.** — Cambridge studies in advanced mathematics, vol. 92. — Un vol. relié, $16 \times 23,5$, de XII, 265 p. — ISBN 0-521-83207-1. — Prix: £35.00. — Cambridge University Press, Cambridge, 2004.

The most basic algebraic varieties are the projective spaces, and rational varieties are their closest relatives. In many applications where algebraic varieties appear in mathematics and the sciences, we see rational ones emerging as the most interesting examples. The authors have given an elementary treatment of rationality questions using a mix of classical and modern methods. Arising from a summer school course taught by Professor Kollár, this book develops the modern theory of rational and nearly rational varieties at a level that will particularly suit graduate students. There are numerous examples and exercises, one hundred of which are accompanied by fully worked out solutions that will make this book ideal as the basis of a graduate course. It will act as a valuable reference for researchers.

S. MÜLLER-STACH and C. PETERS, (Editors). — **Transcendental aspects of algebraic cycles: proceedings of the Grenoble Summer School, 2001.** — London Mathematical Society lecture note series, vol. 313. — Un vol. broché, 15×23 , de XVIII, 290 p. — ISBN 0-521-54518-8. — Prix: £35.00. — Cambridge University Press, Cambridge, 2004.

The topics range from introductory lectures on algebraic cycles to more advanced material. The advanced lectures are grouped under three headings: Lawson (co-)homology, motives and motivic cohomology, and Hodge theoretic invariants of cycles. Among the topics treated are cycle spaces. Chow topology, morphic cohomology, Grothendieck motives, Chow-Künneth decomposition of the diagonal, motivic cohomology via higher Chow groups, the Hodge conjecture for certain fourfolds, an effective version of Nori's connectivity theorem, and Beilinson's Hodge and Tate conjecture for open complete intersections. As the lectures were intended for non-specialists many examples have been included to illustrate the theory.

Anneaux et algèbres

I.N. HERSTEIN. — **Noncommutative rings.** — The Carus mathematical monographs, no. 15. — Un vol. relié, $13,5 \times 19,5$, de XI, 202 p. — ISBN 0-88385-015-X. — Prix: £20.00. — The Mathematical Association of America, distributed by Cambridge University Press, Cambridge, 2004.

From the preface: This book is not intended as a treatise on ring theory. Instead, the intent here is to present a certain cross-section of ideas, techniques and results that will give the reader some inkling of what is going on and what has gone on in that part of algebra which concerns itself with noncommutative rings. While the account given here is not completely self-contained, to follow it does not require a great deal beyond a good first course in algebra. *Contents:* The Jacobson radical. Semisimple rings. Commutativity theorems. Simple algebras. Representations of finite groups. Polynomial identities. Goldie's theorem. The Golod-Shafarevitch theorem.

Catégories, algèbre homologique, cohomologie des groupes

Robert R. COLBY, Kent R. FULLER. — **Equivalence and duality for module categories: with tilting and cotilting for rings.** — Cambridge tracts in mathematics, vol. 161. — Un vol. relié, 16×23,5, de ix, 152 p. — ISBN 0-521-83821-5. — Prix: £35.00. — Cambridge University Press, Cambridge, 2004.

This book provides a unified approach to many of the theories of equivalence and duality between categories of modules that have transpired over the last 45 years. In particular, during the past dozen or so years many authors (including the authors of this book) have investigated relationships between categories of modules over a pair of rings that are induced by both covariant and contravariant representable functors, in particular by tilting and cotilting theories. By here collecting and unifying the basic results of these investigations with innovative and easily understandable proofs, the authors' aim is to provide an aid to further research in this central topic in abstract algebra and a reference for all whose research lies in this field.

Théorie des groupes et généralisations

Marc CABANES, Michel ENGUEHARD. — **Representation theory of finite reductive groups.** — New mathematical monographs, vol. 1. — Un vol. relié, 16×23,5, de xvii, 436 p. — ISBN 0-521-82517-2. — Prix: £65.00. — Cambridge University Press, Cambridge, 2004.

At the crossroads of representation theory, algebraic geometry and finite group theory, this book blends together many of the main concerns of modern algebra, synthesizing the past 25 years of research, with full proofs of some of the most remarkable achievements in the area. The authors follow three main themes: first, applications of étale cohomology, leading, via notions of twisted induction, unipotent characters and Lusztig's approach to the Jordan decomposition of characters, to the proof of the recent Bonnafé-Rouquier theorems. The second is a straightforward and simplified account of the Dipper-James theorems relating irreducible characters and modular representations, while introducing modular Hecke and Schur algebras. The final theme is local representation theory. One of the main results here is the author's version of Fong-Srinivasan theorems showing the relations between twisted induction and blocks of modular representations.

T. W. MÜLLER, (Editor). — **Groups: topological, combinatorial and arithmetic aspects.** — London Mathematical Society lecture note series, vol. 311. — Un vol. broché, 15×23, de xvi, 587 p. — ISBN 0-521-54287-1. — Prix: £55.00. — Cambridge University Press, Cambridge, 2004.

In 1999 a number of eminent mathematicians were invited to Bielefeld to present lectures at a conference on topological, combinatorial and arithmetic aspects of (infinite) groups. The present volume consists of survey and research articles invited from participants in this conference. Topics covered include topological finiteness properties of groups, Kac-Moody groups, the theory of Euler characteristics, the connection between groups, formal languages and automata, the Magnus-Nielsen method for one-relator groups, atomic and just infinite groups, topology in permutation groups, probabilistic group theory, the theory of subgroup growth, hyperbolic lattices in dimension three, generalised triangle groups and reduction theory.

Groupes topologiques ; groupes et algèbres de Lie

Jean-Philippe ANKER, Bent ORSTED, (Editors). — **Lie theory: Lie algebras and representations.** — Progress in mathematics, vol. 228. — Un vol. relié, 16×24, de ix, 328 p. — ISBN 0-8176-3373-1. — Prix: SFr. 120.00. — Birkhäuser, Basel, 2004.

A wide spectrum of topics is treated, with emphasis on the interplay between representation theory and the geometry of adjoint orbits for Lie algebras over fields of possibly finite characteristic, as well as for infinite-dimensional Lie algebras. Also covered is unitary representation theory and branching laws for reductive subgroups, an active part of modern representation theory. Finally, there is a thorough discussion of compactifications of symmetric spaces, and harmonic analysis through a far-reaching generalization of Harish-Chandra's Plancherel formula for semisimple Lie groups. Ideal for graduate students and researchers, *Lie Theory* provides a broad, clearly focused examination of semisimple Lie groups and their integral importance to research in many branches of mathematics.

Daniel BUMP. — **Lie groups.** — Graduate texts in mathematics, vol. 225. — Un vol. relié, 16×24, de xi, 451 p. — ISBN 0-387-21154-3. — Prix: €64.95. — Springer, New York, 2004.

This book is intended for a one-year graduate course on Lie groups and Lie algebras. The author proceeds beyond the representation theory of compact Lie groups (which is the basis of many texts) and provides a carefully chosen range of material to give the student the bigger picture. For compact Lie groups, the Peter-Weyl theorem, conjugacy of maximal tri, Weyl character formula and more are covered. The book continues with the study of complex analytic groups, then general noncompact Lie groups, including the Coxeter presentation of the Weyl group, the Iwasawa and Bruhat decompositions, Cartan decomposition, symmetric spaces, Cayley transforms, relative root systems, Satake diagrams, extended Dynkin diagrams and a survey of the ways Lie groups may be embedded in one another. The book culminates in a topics section giving depth to the student's understanding of representation theory, taking the Frobenius-Schur duality between the representation theory of the symmetric group and the unitary groups as a unifying theme, with many applications in diverse areas.

Patrick DELORME, Michèle VERGNE, (Editors). — **Noncommutative harmonic analysis in honor of Jacques Carmona** — Progress in mathematics, vol. 220. — Un vol. relié, 16×24, de xvi, 509 p. — ISBN 0-8176-3207-7. — Prix: SFr. 152.00. — Birkhäuser, Basel, 2004.

This volume is devoted to the theme of noncommutative harmonic analysis and consists of articles in honor of Jacques Carmona, whose scientific interests range through all aspects of Lie group representations. The topics encompass the theory of representations of reductive Lie groups, and especially the determination of the unitary dual, the problem of geometric realizations of representations, harmonic analysis on reductive symmetric spaces, the study of automorphic forms, and results in harmonic analysis that apply to the Langlands program. General Lie groups are also discussed, particularly from the orbit method perspective, which has been a constant source of inspiration for both the theory of reductive Lie groups and for general Lie groups. Also covered is Kontsevich quantization, which has appeared in recent years as a powerful tool.

James LEPOWSKY, Haisheng LI. — **Introduction to vertex operator algebras and their representations.** — Progress in mathematics, vol. 227. — Un vol. relié, 16×24, de xi, 318 p. — ISBN 0-8176-3408-8. — Prix: SFr. 154.00. — Birkhäuser, Basel, 2004.

The deep and relatively new field of vertex operator algebras is intimately related to a variety of areas in mathematics and physics: for example, the concepts of “monstrous moonshine,” infinite-dimensional Lie theory, string theory, and conformal field theory. This book introduces the reader to the fundamental theory of vertex operator algebras and its basic techniques and examples. Beginning with a detailed presentation of the theoretical foundations and proceeding to a range of applications, the text includes a number of new, original results and also highlights and brings fresh perspective to important works of many researchers. After introducing the elementary “formal calculus” underlying the subject, the book provides an axiomatic development of vertex operator algebras and their modules, expanding on the early contributions of R. Borcherds, I. Frenkel, J. Lepowsky, A. Meurman, Y.-Z. Huang, C. Dong, Y. Zhu and others. The concept of a “representation” of a vertex (operator) algebra is treated in detail, following and extending the work of H. Li; this approach is used to construct important families of vertex (operator) algebras and their modules. Requiring only a familiarity with basic algebra, *Introduction to Vertex Operator Algebras and Their Representations* will be useful for graduate students and researchers in mathematics and physics.

Fonctions de variables réelles

J.J. DUISTERMAAT, J.A.C. KOLK. — **Multidimensional real analysis, vol 1: Differentiation ; vol. 2: Integration.** — Translated from Dutch by J.P. van Braam Houckgeest— Cambridge studies in advanced mathematics, vol. 86 et vol. 87. — Deux vol. reliés, 16×23,5, de 798 pages — ISBN 0-521-55114-5 (vol. 1), ISBN 0-521-82925-9 (vol. 2). — Prix: £75.00 (pour l'ensemble des vol. 1 et 2). — Cambridge University Press, Cambridge, 2004.

This comprehensive and innovative work on multidimensional real analysis is based on extensive teaching experience at Utrecht University and gives a thorough account of differential analysis in multidimensional Euclidean space. It is an ideal preparation for students who wish to go on to more advanced study. The notation is carefully organized and all proofs are clean, complete and rigorous. The authors have taken care to pay proper attention to all aspects of the theory. In many respects this book presents an original treatment of the subject and it contains many results and exercises that cannot be found elsewhere. The numerous exercises illustrate a variety of applications in mathematics and physics. This, combined with the exhaustive and transparent treatment of the subject matter, makes the book ideal as either the text for a course, a source of problems for a seminar or for self study. — *Contents of vol. 1:* Continuity. Differentiation. Inverse function and implicit function theorems. Manifolds. Tangent spaces. Exercises. — *Contents of vol. 2:* Integration. Integration over submanifolds. Oriented integration. Exercises.

J. Michael STEELE. — **The Cauchy-Schwarz master class: an introduction to the art of mathematical inequalities.** — Un vol. broché, 15×23, de x, 306 p. — ISBN 0-521-54677-X (relié: 0-521-83775-8). — Prix: £18.95 (relié: £50.00). — Cambridge University Press, Cambridge, 2004.

This lively, problem-oriented text is designed to coach readers toward mastery of the most fundamental mathematical inequalities. With the Cauchy-Schwarz inequality as the initial guide, the reader is led through a sequence of fascinating problems whose solutions are

presented as they might have been discovered - either by one of history's famous mathematicians or by the reader. The problems emphasize beauty and surprise, but along the way readers will find systematic coverage of the geometry of squares, convexity, the ladder of power means, majorization, Schur convexity, exponential sums, and the inequalities of Hölder, Hilbert, and Hardy. The text is accessible to anyone who knows calculus and who cares about solving problems. It is well suited to self-study, directed study, or as a supplement to courses in analysis, probability, and combinatorics.

Mesure et intégration

Marek CAPIŃSKI, Ekkehard KOPP. — **Measure, integral and probability.** — Second edition. — Springer undergraduate mathematics series. — Un vol. broché, $17,5 \times 23,5$, de xv, 311 p. — ISBN 1-85233-781-8. — Prix: €39.95. — Springer, London, 2004.

This book is a gentle introduction that makes measure and integration theory accessible to the average third-year undergraduate student. The ideas are developed at an easy pace in a form that is suitable for self-study, with an emphasis on clear explanations and concrete examples rather than abstract theory. For this second edition, the text has been thoroughly revised and expanded. *New features include:* — A substantial new chapter, featuring a constructive proof of the Radon-Nikodym theorem, an analysis of the structure of Lebesgue-Stieltjes measures, the Hahn-Jordan decomposition, and a brief introduction to martingales. — Key aspects of financial modeling, including the Black-Scholes formula, discussed briefly from a measure-theoretical perspective to help the reader understand the underlying mathematical framework.

Fonctions de plusieurs variables complexes

Mats ANDERSON, Mikael PASSARE, Ragnar SIGURDSSON. — **Complex convexity and analytic functionals.** — Progress in mathematics, vol. 225. — Un vol. relié, 16×24 , de xi, 160 p. — ISBN 3-7643-2420-1. — Prix: SFr. 130.00. — Birkhäuser, Basel, 2004.

A set in complex Euclidean space is called **C-convex** if all its intersections with complex lines are contractible, and it is said to be linearly convex if its complement is a union of complex hyperplanes. These notions are intermediates between ordinary geometric convexity and pseudoconvexity. Their importance was first manifested in the pioneering work of André Martineau from about forty years ago. Since then a large number of new related results have been obtained by many different mathematicians. The present book puts the modern theory of complex linear convexity on a solid footing, and gives a thorough and up-to-date survey of its current status. Applications include the Fantappiè transformation of analytic functionals, integral representation formulas, polynomial interpolation, and solutions to linear partial differential equations.

Daniel HUYBRECHTS. — **Complex geometry: an introduction.** — Universitext. — Un vol. broché, $15,5 \times 23,5$, de xii, 309 p. — ISBN 3-540-21290-6. — Prix: €49.95. — Springer, Berlin, 2004.

Complex geometry studies (compact) complex manifolds. It discusses algebraic as well as metric aspects. The subject is on the crossroad of algebraic and differential geometry. Recent developments in string theory have made it a highly attractive area, both for mathematicians and theoretical physicists. The author's goal is to provide an easily accessible introduction to

the subject. The book contains detailed accounts of the basic concepts and the many exercises illustrate the theory. Appendices to various chapters allow an outlook to recent research directions.

Fonctions spéciales

George GASPER, Mizan RAHMAN. — **Basic hypergeometric series.** — Second edition. — Encyclopedia of mathematics and its applications, vol. 96. — Un vol. relié, 16,5×24, de XXIII, 428 p. — ISBN 0-521-83357-4. — Prix: £65.00. — Cambridge University Press, Cambridge, 2004.

This revised and expanded new edition will continue to meet the need for an authoritative, up-to-date, self contained, and comprehensive account of the rapidly growing field of basic hypergeometric series, or q -series. It contains almost all of the important summation and transformation formulas of basic hypergeometric series one needs to know for work in fields such as combinatorics, number theory, modular forms, quantum groups and algebras, probability and statistics, coherent-state theory, orthogonal polynomials, or approximation theory. Simplicity, clarity, deductive proofs, thought-fully designed exercises, and useful appendices are among its strengths. Elsewhere some new material and exercises have been added to reflect recent developments, and the bibliography has been revised to maintain its comprehensive nature.

Équations aux dérivées partielles

Ryogo HIROTA. — **The direct method in soliton theory.** — Cambridge tracts in mathematics, vol. 155. — Un vol. relié, 15,5×23,5, de XI, 200 p. — ISBN 0-521-83660-3. — Prix: £40.00. — Cambridge University Press, Cambridge, 2004.

The bilinear, or Hirota's direct, method was invented in the early 1970s as an elementary means of constructing soliton solutions that avoided the use of the heavy machinery of the inverse scattering transform, and was successfully used to construct the multisoliton solutions of many new equations. In the 1980s the deeper significance of the tools used in this method – Hirota derivatives and the bilinear form – came to be understood, following the work of the Kyoto school, as a key ingredient in Sato's theory and the connections with affine Lie algebras. The main part of this book concerns the more modern version of the method in which solutions are expressed in the form of determinants and τ -functions. While maintaining the original philosophy of using relatively simple mathematics it has, nevertheless, been influenced by the deeper understanding that came out of the work of the Kyoto school.

Systèmes dynamiques et théorie ergodique

Michael BRIN, Boris HASSELBLATT, Yakov PESIN, (Editors). — **Modern dynamical systems and applications: dedicated to Anatole Katok on his 60th birthday.** — Un vol. relié, 18,5×26, de XIV, 458 p. — ISBN 0-521-84073-2. — Prix: £55.00. — Cambridge University Press, Cambridge, 2004.

This volume presents an overview of the theory of dynamical systems. It contains many expository contributions by a list of leading researchers, including several Fields medalists. A broad span of topics is covered. Major areas include: hyperbolic dynamics, elliptic dynamics,

mechanics, ergodic theory, group actions, rigidity, applications. Here dynamicists will find surprising new results in their own specialty as well as surveys in others, and mathematicians from other disciplines who wish for a sample of current developments in ergodic theory and dynamical systems should look no further.

Analyse de Fourier, analyse harmonique abstraite

Ole CHRISTENSEN, Khadija L. CHRISTENSEN. — **Approximation theory: from Taylor polynomials to wavelets.** — Applied and numerical harmonic analysis. — Un vol. broché, 15,5×23,5, de xi, 156 p. — ISBN 0-8176-3600-5. — Prix: SFr. 62.00. — Birkhäuser, Boston, 2004.

This concisely written book gives an elementary introduction to a classical area of mathematics – approximation theory – in a way that naturally leads to the modern field of wavelets. The exposition, driven by ideas rather than technical details and proofs, demonstrates the dynamic nature of mathematics and the influence of classical disciplines on many areas of modern mathematics and applications. *Key features and topics:* Description of wavelets in words rather than mathematical symbols. — Elementary introduction to approximation using polynomials (Weierstrass' and Taylor's theorems). — Introduction to infinite series, with emphasis on approximation-theoretic aspects. — Introduction to Fourier analysis. — Numerous classical, illustrative examples and constructions. — Discussion of the role of wavelets in digital signal processing and data compression, such as the FBI's use of wavelets to store fingerprints. — Minimal prerequisites: elementary calculus. — Exercises that may be used in undergraduate and graduate courses on infinite series and Fourier series.

Peter DUREN. — **Harmonic mappings in the plane.** — Cambridge tracts in mathematics, vol. 156. — Un vol. relié, 16×23,5, de xii, 212 p. — ISBN 0-521-64121-7. — Prix: £40.00. — Cambridge University Press, Cambridge, 2004.

Harmonic mappings in the plane are univalent complex-valued harmonic functions of a complex variable. Conformal mappings are a special case where the real and imaginary parts are conjugate harmonic functions, satisfying the Cauchy-Riemann equations. Harmonic mappings were studied classically by differential geometers because they provide isothermal (or conformal) parameters for minimal surfaces. More recently they have been actively investigated by complex analysts as generalizations of univalent analytic functions, or conformal mappings. Many classical results of geometric function theory extend to harmonic mappings but basic questions remained unresolved. This book is the first comprehensive account of the theory of planar harmonic mappings, treating both the generalizations of univalent analytic functions and the connections with minimal surfaces. Essentially self-contained, the book contains background material in complex analysis and a full development of the classical theory of minimal surfaces, including the Weierstrass-Enneper representation. It is designed to introduce nonspecialists to a beautiful area of complex analysis and geometry.

Yitzhak KATZNELSON. — **An introduction to harmonic analysis.** — Third edition. — Cambridge mathematical library. — Un vol. broché, 15×24, de xv, 314 p. — ISBN 0-521-54359-2 (relié: 0-521-54359-2). — Prix: £18.95 (relié: £50.00). — Cambridge University Press, Cambridge, 2004.

First published in 1968, this book has withstood the test of time and earned Professor Katznelson the 2002 Leroy P. Steele Prize for mathematical exposition. The aim of the book

is to demonstrate the central ideas of harmonic analysis in a concrete setting and to provide a stock of examples to foster a clear understanding of the theory. Once these ideas are established, the author goes on to show that the scope of harmonic analysis extends far beyond the setting of the circle group, and he opens the door to other contexts by considering Fourier transforms on the real line as well as a brief look at Fourier analysis on locally compact Abelian groups. This new edition has been revised by the author and offers some additional material, including topics from approximation theory and examples of the use of probabilistic methods in harmonic analysis.

Transformations intégrales, calcul opérationnel

Victor PALAMODOV. — **Reconstructive integral geometry.** — Monographs in mathematics, vol. 98. — Un vol. relié, de 17×24 , de ix, 164 p. — ISBN 3-7643-7129-3. — Prix: SFr. 108.00. — Birkhäuser, Basel, 2004.

This book covers facts and methods for the reconstruction of a function in a real affine or projective space from data of integrals, particularly over lines, planes, and spheres. Recent results are collected stressing explicit analytic methods. Another focus consists of the relations between algebraic integral geometry and partial differential equations. A concise basic course in harmonic analysis and distribution theory is given in the first chapter. The first half of the book includes the ray, the spherical mean transforms in the plane or in 3-space, and inversion from incomplete data. It will be of particular interest to application oriented readers. Further chapters are devoted to the Funk-Radon transform on algebraic varieties of arbitrary dimension.

Géométrie

Károly BÖRÖCZKY, Jr. — **Finite packing and covering.** — Cambridge tracts in mathematics, vol. 154. — Un vol. relié, $16 \times 23,5$, de xvii, 380 p. — ISBN 0-521-80157-5. — Prix: £45.00. — Cambridge University Press, Cambridge, 2004.

Finite arrangements of convex bodies were intensively investigated in the second half of the twentieth century. Connections were made to many other subjects, including crystallography, the local theory of Banach spaces, and combinatorial optimization. This book, the first one dedicated solely to the subject, provides an in-depth, state-of-the-art discussion of the theory of finite packings and coverings by convex bodies. It contains various new results and arguments, besides collecting those scattered throughout the literature, and provides a comprehensive treatment of problems whose interplay was not clearly understood before. To make the material more accessible, each chapter is essentially independent, and two-dimensional and higher-dimensional arrangements are discussed separately. Arrangements of congruent convex bodies in Euclidean space are discussed, and the density of finite packing and covering by balls in Euclidean, spherical, and hyperbolic spaces is considered.

C.G. GIBSON. — **Elementary Euclidean geometry: an introduction.** — Un vol. relié, $16 \times 23,5$, de xvi, 174 p. — ISBN 0-521-83448-1. — Prix: £32.50. — Cambridge University Press, Cambridge, 2003.

This is a genuine introduction to the geometry of lines and conics in the Euclidean plane. Lines and circles provide the starting point, with the classical invariants of general conics

introduced at an early stage, yielding a broad subdivision into types, a prelude to the congruence classification. A recurring theme is the way in which lines intersect conics. From single lines one proceeds to parallel pencils, leading to midpoint loci, axes and asymptotic directions. Likewise, intersections with general pencils of lines lead to the central concepts of tangent, normal, pole and polar. The treatment is example-based and self-contained, assuming only a basic grounding in linear algebra. With numerous illustrations and several hundred worked examples and exercises, this book is ideal for use with undergraduate courses in mathematics.

Géométrie différentielle

Paul BAIRD, Ahmad EL SOUFI, Ali FARDOUN, Rachid REGBAOUI, (Editors). — **Variational problems in Riemannian geometry: bubbles, scans and geometric flows.** — Progress in nonlinear differential equations and their applications, vol. 59. — Un vol. relié, $16 \times 23,5$, de xvii, 148 p. — ISBN 3-7643-2432-5. — Prix: SFr. 128.00. — Birkhäuser, Basel, 2004.

This book is devoted to the study of maps and metrics that arise as extremals of a variational problem. Solutions, in general, satisfy an elliptic partial differential equation and can often be obtained by deformation under a geometric flow. The work particularly concentrates on singular behaviour, such as bubbling phenomena and the formation of solitons in the harmonic map flow and Ricci flow, respectively. The articles provide a balance between introductory surveys and the most recent research, with a unique perspective on singular phenomena. Notions such as scans and the study of evolution by curvature of networks of curves are completely new and lead the reader to the frontiers of the domain.

Klaus ECKER. — **Regularity theory for mean curvature flow.** — Progress in nonlinear differential equations and their applications, vol. 57. — Un vol. broché, de $15,5 \times 23,5$, de xi, 165 p. — ISBN 0-8176-3781-8. — Prix: SFr. 108.00. — Birkhäuser, Basel, 2004.

This work is devoted to the motion of surfaces for which the normal velocity at every point is given by the mean curvature at that point; this geometric heat flow process is called mean curvature flow. Mean curvature flow and related geometric evolution equations are important tools in mathematics and mathematical physics. A major example is Hamilton's Ricci flow program, which has the aim of settling Thurston's geometrization conjecture, with recent major progress due to Perelman. Another important application of a curvature flow process is the resolution of the famous Penrose conjecture in general relativity by Huisken and Ilmanen. Under mean curvature flow, surfaces usually develop singularities in finite time. This work presents techniques for the study of singularities of mean curvature flow and is largely based on the work of K. Brakke, although more recent developments are incorporated.

Theodore FRANKEL. — **The geometry of physics: an introduction.** — Second edition. — Un vol. relié, $17,5 \times 25,5$, de xxvi, 694 p. — ISBN 0-521-53927-7. — Prix: £30.00. — Cambridge University Press, Cambridge, 2004.

This book is intended to provide a working knowledge of those parts of exterior differential forms, differential geometry, algebraic and differential topology, Lie groups, vector bundles, and Chern forms that are essential for a deeper understanding of both classical and modern physics and engineering. Included are discussions of analytical and fluid

dynamics, electromagnetism (in flat and curved space), thermodynamics, elasticity theory, the geometry and topology of Kirchhoff's electric circuit laws, soap films, special and general relativity, the Dirac operator and spinors, and gauge fields, including Yang-Mills, the Aharonov-Bohm effect, Berry phase, and instanton winding numbers, quarks, and the quark model for mesons. Before a discussion of abstract notions of differential geometry, geometric intuition is developed through a rather extensive introduction to the study of surfaces in ordinary space; consequently, the book should be of interest also to mathematics students.

Sylvestre GALLOT, Dominique HULIN, Jacques LAFONTAINE. — **Riemannian geometry.** — Third edition. — Universitext. — Un vol. broché, $15,5 \times 23,5$, de xv, 322 p. — ISBN 3-540-20493-8. — Prix : €34.95. — Springer, Berlin, 2004.

This book, based on graduate course on Riemannian geometry and analysis on manifolds, held in Paris, covers the topics of differential manifolds, Riemannian metrics, connections, geodesics and curvature, with special emphasis on the intrinsic features of the subject. Classical results on the relations between curvature and topology are treated in detail. The book is quite self-contained, assuming of the reader only differential calculus in Euclidean space. It contains numerous exercises with full solutions and a series of detailed examples which are picked up repeatedly to illustrate each new definition or property introduced. For this third edition, some topics on geodesic flow and Lorentzian geometry have been added and worked out in the same spirit.

Juan-Pablo ORTEGA, Tudor S. RATIU. — **Momentum maps and Hamiltonian reduction.** — Progress in mathematics, vol. 222. — Un vol. relié, 16×24 , de xxxiv, 497 p. — ISBN 0-8176-4307-9. — Prix : SFr. 118.00. — Birkhäuser, Basel, 2004.

The use of symmetries and conservation laws in the qualitative description of dynamics has a long history going back to the founders of classical mechanics. In some instances, the symmetries in a dynamical system can be used to simplify its kinematical description via an important procedure that has evolved over the years and is known generically as reduction. The focus of this work is a comprehensive and self-contained presentation of the intimate connection between symmetries, conservation laws, and reduction, treating the singular case in detail. The exposition reviews the necessary prerequisites, beginning with an introduction to Lie symmetries on Poisson and symplectic manifolds. This is followed by a discussion of momentum maps and the geometry of conservation laws that are used in the development of symplectic reduction. The symplectic slice theorem is also treated in detail, as well the reconstruction equations that have been crucial in applications to the study of symmetric mechanical systems. The last part of the book contains more advanced topics, such as symplectic stratifications, optimal and Poisson reduction, singular reduction by stages, bifoliations and dual pairs. Various possible research directions are pointed out in the introduction and throughout the text. This Ferran Sunyer – Balaguer Prize-winning monograph is the first self-contained and thorough presentation of the theory of Hamiltonian reduction in the presence of singularities.

V. OVSIENKO, S. TABACHNIKOV. — **Projective differential geometry: old and new: from the Schwarzian derivative to the cohomology of diffeomorphism groups.** — Cambridge tracts in mathematics, vol. 165. — Un vol. relié, $15,5 \times 23,5$, de xi, 249 p. — ISBN 0-521-83186-5. — Prix : £45.00. — Cambridge University Press, Cambridge, 2004.

The book starts with a detailed discussion of the simplest differential projective invariant – the Schwarzian derivative – and its connection to the Virasoro algebra, one the most popular

objects of study in mathematical physics today. About half of the book is devoted to one-dimensional projective differential geometry and related topics: differential operators, the cohomology of the group of diffeomorphisms of the circle, the classical four-vertex theorem, its numerous generalizations, and their significance to symplectic and contact topology. The classical projective differential geometry of projective hypersurfaces is surveyed and related to less traditional topics such as the complete integrability of the geodesic flow on the ellipsoid, Hilbert's fourth problem, and very recent results and conjectures in the projective differential topology of surfaces. A final chapter considers various versions of the multi-dimensional Schwarzian derivative, including the Lagrangian Schwarzian and multi-dimensional Sturm theory. The seven appendices cover diverse background material from proofs of the Sturm-Hurwitz theorem to symplectic and contact geometry, from the Godbillon-Vey class to infinite-dimensional Poisson geometry.

Topologie algébrique

Andrew BAKER, Birgit RICHTER, (Editors). — **Structured ring spectra.** — London Mathematical Society lecture notes series, vol. 315. — Un vol. broché, 15×23 , de 236 p. — ISBN 0-521-60305-6. — Prix: £35.00. — Cambridge University Press, Cambridge, 2004.

Within algebraic topology, the prominent role of multiplicative cohomology theories has led to a great deal of foundational research on ring spectra and in the 1990's this gave rise to significant new approaches to constructing categories of spectra and ring-like objects in them. This book contains some important new contributions to the theory of structured ring spectra as well as survey papers describing these and relationships between them. One important aspect is the study of strict multiplicative structures on spectra and the development of obstruction theories to imposing strictly associative and commutative ring structures on spectra. A different topic is the transfer of classical algebraic methods and ideas, such as Morita theory, to the world of stable homotopy.

Topologie des variétés, analyse globale et analyse des variétés

Michèle AUDIN. — **Torus actions on symplectic manifolds.** — Second revised edition. — Progress in mathematics, vol. 93. — Un vol. relié, 16×24 , de VIII, 325 p. — ISBN 3-7643-2176-8. — Prix: SFr. 128.00. — Birkhäuser, Basel, 2004.

The first edition of this book was published in this series in 1991. The material and references have been updated. Symplectic manifolds and torus actions are investigated, with numerous examples of torus actions, for instance on some moduli spaces. Although the book is still centered on convexity theorems, it contains many more results, proofs and examples. The first chapter deals with Lie group actions on manifolds. In chapters II and III, symplectic geometry and Hamiltonian group actions are introduced, especially torus actions and action-angle variables. The core of the book is chapter IV which is devoted to applications of Morse theory to Hamiltonian group actions, including convexity theorems. As a family of examples of symplectic manifolds, moduli spaces of flat connections are discussed in chapter V. Then, chapter VI centers on the Duistermaat-Heckman theorem. In chapter VII, a topological construction of complex toric varieties is presented, and the last chapter illustrates the introduced methods for Hamiltonian circle actions on 4-manifolds.

Peter CROMWELL. — **Knots and links.** — Un vol. broché, de $17,5 \times 24,5$, de xvii, 328 p. — ISBN 0-521-54831-4 (relié: 0-521-83947-5). — Prix: £25.00 (relié: £70.00). — Cambridge University Press, Cambridge, 2004.

This readable and richly illustrated book explores selected topics in depth in a way that makes contemporary mathematics accessible to an undergraduate audience. It can be used for upper-division courses, and assumes only knowledge of basic algebra and elementary topology. The techniques developed include combinatorics applied to diagrams, the study of surface intersections and “cut and paste” surgery, skein theory of polynomial invariants and the properties of tangles. Together with standard topics such as Seifert matrices and Alexander and Jones polynomials, the book explains polygonal and smooth presentations, the surgery equivalence of surfaces, the behaviour of invariants under factorisation and the satellite construction, the arithmetic of Conway’s rational tangles and arc presentations. The families of torus knots, pretzel knots, rational (or 2-bridge) links and doubles of the trefoil recur as examples throughout the text. Alongside the systematic development of the main theory, there are discussion sections that cover historical aspects, motivation, possible extensions, and applications. Many examples and exercises are included to show both the power and limitations of the techniques developed.

Ulrike TILLMAN, (Editor). — **Topology, geometry and quantum field theory: proceedings of the 2002 Oxford symposium in honour of the 60th birthday of Graeme Segal.** — London Mathematical Society lecture note series, vol. 308. — Un vol. broché, 15×23 , de xii, 577 p. — ISBN 0-521-54049-6. — Prix: £50.00. — Cambridge University Press, Cambridge, 2004.

The symposium held in honour of the 60th birthday of Graeme Segal brought together leading physicists and mathematicians from around the world. The topics discussed were string theory, M-theory and quantum gravity on the one hand, and K-theory, elliptic cohomology, quantum cohomology and string topology on the other. Strands of geometry and quantum physics have developed in parallel since the recognition in the late seventies of the central role of non-Abelian gauge theory in elementary particle physics, and the emerging study of super-symmetry and string theory. Graeme Segal’s manuscript *The definition of conformal field theory* is published here for the first time. It has been greatly influential in the 15 years since it was written. A new introduction by the author sets it in a contemporary context.

C.T.C. WALL. — **Singular points of plane curves.** — London Mathematical Society student texts, vol. 63. — Un vol. broché, 15×23 , de xi, 370 p. — ISBN 0-521-54774-1 (relié: 0-521-83904-1). — Prix: £27.00 (relié: £55.00). — Cambridge University Press, Cambridge, 2004.

The simplest singularities of a plane curve are self-crossings and cusps. Equivalence of singular points of (complex) plane curves can be defined using combinatorial data, resolution data or topological data; all give the same result. The first half of this book, which is based on an M.Sc. course, works up to this synthesis via Puiseux series (parametrising the curve), resolution of singularities, “infinitely near points” and the Alexander polynomial. For curves in the projective plane, formulae for the genus and the class depend on the singularities. The topology gives a fibration (due to Milnor), described by the monodromy self-map of the fibre, a compact surface. The monodromy is approached through resolution trees, the group of exceptional cycles, combinatorial data, and the decomposition theorems of Thurston and of Jaco-Shalen-Johannsen. The author obtains a

criterion for the monodromy to be (setwise) finite and a close relation between the Eggers tree, the resolution graph and the Eisenbud-Neumann diagram. He calculates the characteristic polynomials of the monodromy, studies the Seifert form, and calculates the signatures that determine it over the reals. Ideals in the local ring of a point are related to the cycles studied earlier, and (by a Galois correspondence) with the clusters of Enriques; this involves valuative and integral closure.

Tilmann WURZBACHER, (Editor). — **Infinite dimensional groups and manifolds.** — IRMA lectures in mathematics and theoretical physics, vol. 5. — Un vol. broché, 17×24, de VIII, 248 p. — ISBN 3-11-018186-X. — Prix: €34.53. — Walter de Gruyter, Berlin, 2004.

The volume is a collection of refereed research papers on infinite dimensional groups and manifolds in mathematics and quantum physics. Topics covered are: new classes of Lie groups of mappings, the Burgers equation, the Chern-Weil construction in infinite dimensions, the Hamiltonian approach to quantum field theory, and different aspects of large N limits ranging from approximation methods in quantum mechanics to modular forms and string/gauge theory duality. The volume gives an overview of important themes of research at the forefront of mathematics and theoretical physics.

Probabilités et processus stochastiques

Robert C. DALANG, Marco DOZZI, Francesco RUSSO, (Editors). — **Seminar on Stochastic Analysis, Random Fields and Applications IV, Centro Stefano Franscini, Ascona, May 2002.** — Progress in probability, vol. 58. — Un vol. relié, 16,5×24, de XII, 328 p. — ISBN 3-7643-7131-5. — Prix: SFr. 178.00. — Birkhäuser, Basel, 2004.

The seminar focused mainly on stochastic partial differential equations, stochastic models in mathematical physics, and financial engineering. The book will be a valuable resource for both researchers in stochastic analysis and professionals interested in stochastic methods in finance and insurance. — *Contributors:* R.J. Adler, X. Bardina, J. Bertoin, P. Biane, A.B. Cruzeiro, J.A. Cuesta-Albertos, R.C. Dalang, I.M. Davies, S. Deparis, M.A. Diop, E. Eberlein, F. Flandoli, J.-P. Fouque, M. Gubinelli, E.A. v. Hahn, P. Imkeller, S. Kwapień, R. Léandre, P. Lescot, O. Lévêque, D. Márquez-Carreras, C. Martini, A. Mira, G. Papanicolaou, E. Pardoux, I. Pavlyukevich, M.-C. Quenez, J. Rosinski, C. Rovira, R. Sircar, C. Striker, P. Tenconi, S. Tindel, A. Truman, M. Wschebor, M. Yor, J.-C. Zambrini, X. Zhang, H. Zhao.

Jean JACOD, Philip PROTTER. — **Probability essentials.** — Universitext. — Second edition. — Un vol. broché, 15,5×23,5, de X, 254 p. — ISBN 3-540-43871-8. — Prix: €34.95. — Springer, Berlin, 2004.

This introduction to probability theory can be used, at the beginning graduate level, for a one-semester course on probability theory or for self-direction without benefit of a formal course; the measure theory needed is developed in the text. It will also be useful for students and teachers in related areas such as finance theory (economics), electrical engineering, and operations research. The text covers the essentials in a directed and lean way with 28 short chapters. Assuming of readers only an undergraduate background in mathematics, it brings them from a starting knowledge of the subject to a knowledge of the basics of martingale theory. The second edition contains some additions to the text and to the references and some parts are completely rewritten.

Vadim A. KAIMANOVICH, (Editor). — In collaboration with Klaus SCHMIDT, Wolfgang WOESS. — **Random walks and geometry: proceedings of a Workshop at the Erwin Schrödinger Institute, Vienna, June 18-July 13, 2001.** — Un vol. relié, 17,5×24,5, de x, 532 p. — ISBN 3-11-017237-2. — Prix: €168.00. — Walter de Gruyter, Berlin, 2004.

This volume is an outcome of the special semester 2001 - *Random Walks* held at the Schrödinger Institute in Vienna, Austria. It contains original research articles with non-trivial new approaches based on applications of random walks and similar processes to Lie groups, geometric flows, physical models on infinite graphs, random number generators, Lyapunov exponents, geometric group theory, spectral theory of graphs and potential theory. Highlights are the first survey of the theory of the stochastic Loewner evolution and its applications to percolation theory (a new rapidly developing and very promising subject at the crossroad of probability, statistical physics and harmonic analysis), surveys on expander graphs, random matrices and quantum chaos, cellular automata and symbolic dynamical systems, and others.

Luis SANTALÓ. — **Integral geometry and geometric probability.** — Cambridge mathematical library. — Second edition. — Un vol. broché, 15×23, de xvii, 404 p. — ISBN 0-521-52344-3. — Prix: £30.00. — Cambridge University Press, Cambridge, 2004.

Now available in the Cambridge Mathematical Library, the classic work from Luis Santaló. Integral geometry originated with problems on geometrical probability and convex bodies. Its later developments, however, have proved useful in several fields ranging from pure mathematics (measure theory, continuous groups) to technical and applied disciplines (pattern recognition, stereology). The book is a systematic exposition of the theory and a compilation of the main results in the field. It can be used to complement courses on differential geometry, Lie groups or probability, or differential geometry. It is ideal both as a reference work and as a text for those wishing to enter the field.

Henk TIJMS. — **Understanding probability: chance rules in everyday life.** — Un vol. broché, 15,5×23, de x, 380 p. — ISBN 0-521-54036-4 (relié: 0-521-83329-9). — Prix: £18.99 (relié: £40.00). — Cambridge University Press, Cambridge, 2004.

Here, the reader can learn about the world of probability in an informal way. Lotteries and casino games provide a natural source of motivation, and these are carefully discussed with many worked examples to illustrate the key concepts and ideas from probability theory. The emphasis is on why probability works and how it can be applied. The author introduces the reader to the law of large numbers, betting systems, random walks, the bootstrap, rare events, the central limit theorem, the multivariate normal distribution, the Bayesian approach, generating functions, and more.

Statistique

Yadolah DODGE. — **Statistique: dictionnaire encyclopédique.** — Un vol. relié, 21,5×28, de xix, 634 p. — ISBN 2-287-21325-2. — Prix: €66.30. — Springer, Paris, 2004.

La statistique joue un rôle de tout premier plan dans d'innombrables domaines, en sciences pures comme en sciences appliquées: des mathématiques à la physique, de la chimie à la biologie ou de l'économie à la sociologie, c'est un outil devenu indispensable. Pour avoir un accès pratique et rapide aux concepts et aux méthodes de la statistique, la formule la plus

efficace est celle du dictionnaire: qu'il soit consulté ponctuellement ou bien utilisé dans le cadre d'une recherche approfondie, cet ouvrage contient l'information nécessaire – mieux, il procure plusieurs degrés d'explication adaptés à chaque besoin. A chaque entrée correspondent un historique de la notion traitée, des explications mathématiques, des domaines de validité et limitations, des exemples et des mots-clés avec leur équivalent en anglais. La biographie de nombreux chercheurs illustres invite à suivre l'évolution de la statistique de ses débuts jusqu'à la période contemporaine, où elle atteint sa pleine maturité. Un système de renvois permet de prolonger l'explication des termes considérés et d'acquérir une vue d'ensemble de chaque sujet étudié.

Michel LEJEUNE. — **Statistique: la théorie et ses applications.** — Collection Statistique et probabilités appliquées — Un vol. broché, 15,5×23,5, de xiii, 339 p. — ISBN 2-287-21241-8. — Prix: €40.71. — Springer, Paris, 2004.

Cet ouvrage expose les fondements théoriques des méthodes classiques de la statistique (estimation et tests) ainsi que des approches introduites plus récemment. Les premiers chapitres sont consacrés aux notions de la théorie des probabilités, nécessaires à la statistique. Puis sont développés les tests et méthodes d'estimation dans les situations paramétriques et non paramétriques. Enfin sont traités les modèles de base de la régression. Tout au long des chapitres, des exemples et exercices concrets sont proposés. La présentation témoigne d'un réel souci pédagogique de l'auteur qui bénéficie d'une vaste expérience d'enseignement auprès de publics très variés. Les résultats exposés, sont autant que possible, replacés dans la perspective de leur utilité pratique.

J.K. LINDSEY. — **Statistical analysis of stochastic processes in time.** — Cambridge series in statistical and probabilistic mathematics. — Un vol. relié, 18×25, de xiv, 338 p. — ISBN 0-521-83741-3. — Prix: £40.00. — Cambridge University Press, Cambridge, 2004.

Many observed phenomena, from the changing health of a patient to values on the stock market, are characterized by quantities that vary over time: stochastic processes are designed to study them. Much theoretical work has been done but virtually no modern books are available to show how the results can be applied. This book fills that gap by introducing practical methods of applying stochastic processes to an audience knowledgeable only in the basics of statistics. It covers almost all aspects of the subject and presents the theory in an easily accessible form that is highlighted by application to many examples. These examples arise from dozens of areas, from sociology through medicine to engineering. Complementing these are exercise sets making the book suited for introductory courses in stochastic processes. Software is provided within the freely available R system for the reader to be able to apply all the models presented.

Analyse numérique

Christine BERNARDI, Yvon MADAY, Francesca RAPETTI. — **Discretisations variationnelles de problèmes aux limites elliptiques.** — Mathématiques & Applications, vol. 45 — Un vol. broché, 15,5×23,5, de xi, 310 p. — ISBN 3-540-21369-4. — Prix: €54.93. — Springer, Berlin, 2004.

L'analyse numérique de deux types de discrétisations variationnelles est effectuée en détail pour des problèmes elliptiques: les méthodes spectrales et les méthodes d'éléments finis. Les avantages de chaque type sont mis en valeur, et leur mise en œuvre est décrite.

L'originalité de cet ouvrage est d'insérer ces deux types de discrétisation dans un cadre abstrait commun, ce qui permet au lecteur d'étendre l'approche à bien d'autres méthodes et problèmes. Sont présentés également un algorithme pour coupler ces méthodes dans un cadre de décomposition de domaine et une application aux écoulements de fluides incompressibles dans des milieux poreux.

P.G. CIARLET, N. AYACHE, (Editors). — **Handbook of numerical analysis, vol. 12: Special volume: computational models for the human body.** — Un vol. relié, 17×24,5, de xvi, 670 p. — ISBN 0-444-51566-6. — Prix: €215.00. — Elsevier North-Holland, Amsterdam, 2004.

Computational models for the human body is a recent and rapidly progressing area of research whose primary objective is to provide a better understanding of the physiological and mechanical behaviour of the human body and to design tools for their realistic numerical simulations. Although far from being exhaustive, the book covers a large range of methods and an illustrative set of applications, and proposes a number of well defined mathematical and numerical modelling of physical problems (including formal analysis of existence and unicity of solutions for instance). — *Contents*: Mathematical modelling and numerical simulation of the cardiovascular system (A. Quarteroni, L. Formaggia). — Computational methods for cardiac electrophysiology (M. Belik, T. Usyk, A. McCulloch). — Mathematical analysis, controllability and numerical simulation of a simple model of avascular tumor growth (J.I. Diaz, J.I. Tello). — Human models for crash and impact simulation (E. Haug, H.-Y. Choi, S. Robin, M. Beaugonin). — Soft tissue modeling for surgery simulation (H. Delingette, N. Ayache). — Recovering displacements and deformations from 3D medical images using biomechanical models (X. Papademetris, O. Skrinjar, J. Duncan). — Methods for modelling and predicting mechanical deformations of the breast under external perturbations (F. Azar, D. Metaxas, M. Schnall).

Informatique

Sriram PEMMARAJU, Steven SKIENA. — **Computational discrete mathematics: combinatorics and graph theory with Mathematica.** — Un vol. relié, 22×25, de xiii, 480 p. — ISBN 0-521-80686-0. — Prix: £40.00. — Cambridge University Press, Cambridge, 2004.

Combinatorica, an extension to the popular computer algebra system Mathematica, is the most comprehensive software available for educational and research applications of discrete mathematics, particularly combinatorics and graph theory. This book is the definitive reference/user's guide to *Combinatorica*, with examples of all 450 *Combinatorica* functions in action, along with the associated mathematical and algorithmic theory. The authors cover classical and advanced topics on the most important combinatorial objects: permutations, subsets, partitions, and Young tableaux, as well as all important areas of graph theory: graph construction operations, invariants, embeddings, and algorithmic graph theory.

Mécanique des fluides, acoustique

P. G. DRAZIN, W. H. REID. — **Hydrodynamic stability.** — Second edition. — Un vol. broché, 15×23, de xx, 605 p. — ISBN 0-521-52541-1. — Prix: £26.00. — Cambridge University Press, Cambridge, 2004.

Hydrodynamic stability is of fundamental importance in fluid mechanics and is concerned with the problem of transition from laminar to turbulent flow. This book begins with a basic

introduction to three major areas of the subject: thermal convection, rotating and curved flows. A number of applications of the linear theory are discussed, including the effects of stratification and unsteadiness. The book concludes with a chapter describing some of the fundamental ideas involved in current work on nonlinear hydrodynamic stability. The emphasis throughout is on the ideas involved, the physical mechanisms, the methods used and the results obtained, and, wherever possible, the theory is related to both experimental and numerical results. A distinctive feature of the book is the large number of problems it contains. The new edition of this celebrated introduction differs principally by the inclusion of detailed solutions for those exercises, and by the addition of a foreword by Professor J.W. Miles.

Optique, électromagnétique

Paul W. GROSS, P. Robert KOTIUGA. — **Electromagnetic theory and computation: a topological approach.** — Mathematical Sciences Research Institute publications, vol. 48. — Un vol. relié, 16×24,5, de ix, 278 p. — ISBN 0-521-80160-5. — Prix: £45.00. — Cambridge University Press, Cambridge, 2004.

Although topology was recognized by Gauss and Maxwell to play a pivotal role in the formulation of electromagnetic boundary value problems, it is a largely unexploited tool for field computation. The development of algebraic topology since Maxwell provides a framework for linking data structures, algorithms, and computation to topological aspects of three-dimensional electromagnetic boundary value problems. This book attempts to expose the link between Maxwell and a modern approach to algorithms. The first chapters lay out the relevant facts about homology and cohomology, stressing their interpretations in electromagnetism. These topological structures are subsequently tied to variational formulations in electromagnetics, the finite element method, algorithms, and certain aspects of numerical linear algebra. A recurring theme is the formulation of and algorithms for the problem of making branch cuts for computing magnetic scalar potentials and eddy currents. An appendix bridges the gap between the material presented and standard expositions of differential forms, Hodge decompositions, and tools for realizing representatives of homology classes as embedded manifolds.

Économie, recherche opérationnelle, jeux

Steven ROMAN. — **Introduction to the mathematics of finance: from risk management to options pricing.** — Undergraduate texts in mathematics. — Un vol. broché, 15,5×23,5, de 354 p. — ISBN 0-387-21364-3. — Prix: €49.95. — Springer, New York, 2004.

With the exception of an optimal chapter on the Capital Asset Pricing Model, the book concentrates on discrete derivative pricing models, culminating in a careful and complete derivation of the Black-Scholes option pricing formula as a limiting case of the Cox-Ross-Rubinstein discrete model. The final chapter is devoted to American options. The mathematics is not watered down but is appropriate for the intended audience. No measure theory is used and only a small amount of linear algebra is required. All necessary probability theory is developed in several chapters throughout the book, on an “as needed” basis. No background in finance is required, since the book also contains a chapter on options.

Information, communication, circuits

Oded GOLDREICH. — **Foundations of cryptography. II: Basic applications.** — Un vol. relié, 18×26, de xxii, p. 373-798. — ISBN 0-521-83084-2. — Prix: £45.00. — Cambridge University Press, Cambridge, 2004.

Cryptography is concerned with the conceptualization, definition, and construction of computing systems that address security concerns. The design of cryptographic systems must be based on firm foundations. This book presents a rigorous and systematic treatment of foundational issues: defining cryptographic tasks and solving new cryptographic problems using existing tools. The emphasis is on the clarification of fundamental concepts and on demonstrating the feasibility of solving several central cryptographic problems, as opposed to describing ad hoc approaches. This second volume contains a rigorous treatment of three basic applications: encryption, signatures, and general cryptographic protocols. It builds on the previous volume, which provides a treatment of one-way functions, pseudorandomness, and zero-knowledge proofs. It is suitable for use in a graduate course on cryptography and as a reference book for experts. The author assumes basic familiarity with the design and analysis of algorithms; some knowledge of complexity theory and probability is also useful.

R.J. McELIECE. — **The theory of information and coding: student edition.** — Encyclopedia of mathematics and its applications. — Un vol. relié, 15,5×23,5, de xi, 397 p. — ISBN 0-521-83185-7. — Prix: £35.00. — Cambridge University Press, Cambridge, 2004.

This is a revised edition of McEliece's classic, published with students in mind. It is a self-contained introduction to all basic results in the theory of information and coding. This theory was developed to deal with the fundamental problem of communication, that of reproducing at one point, either exactly or approximately, a message selected at another point. There is a short and elementary overview introducing the reader to the concept of coding. Then, following the main results, the channel and source coding theorems, there is a study of specific coding schemes which can be used for channel and source coding. This volume includes dozens of worked examples and several hundred problems for solution. The exposition will be easily comprehensible to readers with some prior knowledge of probability and linear algebra.

Bruno MARTIN. — **Codage, cryptologie et applications.** — Collection technique et scientifique des télécommunications. — Un vol. broché, 16×24, de xvi, 350 p. — ISBN 2-88074-569-1. — Prix: SFr. 64.50. — Presses polytechniques et universitaires romandes, Lausanne, 2004.

La cryptologie assure la confidentialité des communications en présence d'ennemis, alors que les codes correcteurs permettent d'éliminer d'éventuelles erreurs de transmission. L'approche choisie pour cet ouvrage est résolument pratique, en offrant une large place aux applications en télécommunications numériques. Le contenu mathématique de chacune des disciplines est ainsi volontairement simplifié dans le but d'offrir au lecteur une compréhension aussi large que possible du fonctionnement de certains appareils comme les téléphones cellulaires, les disques compacts ou les ordinateurs. L'ouvrage se découpe en cinq parties: théorie de l'information, compression des données, théorie des codes, théorie de la complexité et cryptologie. L'approche conjuguée de la cryptologie et des codes correcteurs au sein d'un même ouvrage de synthèse, illustré des applications les plus récentes, est à ce jour sans équivalent en langue française.

Thomas M. THOMPSON. — **From error correcting codes through sphere packings to simple groups.** — The Carus mathematical monographs, vol. 21. — Un vol. broché, $12,5 \times 19$, de XIV, 228 p. — ISBN 0-88385-037-0. — Prix: £17.99. — The Mathematical Association of America, distributed by Cambridge University Press, Cambridge, 2004.

This title traces a remarkable path of mathematical connections through seemingly disparate topics. Frustrations with a 1940's electro-mechanical computer at a premier research laboratory begins this story. Subsequent mathematical methods of encoding messages to ensure correctness when transmitted over noisy channels lead to discoveries of extremely efficient lattice packings of equal-radius balls, especially in 24-dimensional space. In turn, this highly symmetric lattice, with each point neighboring exactly 196,560 other points, suggested the possible presence of new simple groups as groups of symmetries. Indeed, new groups were found and are now part of the “Enormous Theorem” — the classification of all simple groups whose entire proof runs some 10,000+ pages. And these connections, along with the fascinating history and the proof of the simplicity of one of those “sporadic” simple groups, are presented at an undergraduate mathematical level.

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