Bulletin bibliographique

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BULLETIN BIBLIOGRAPHIQUE

Généralités

David H. BAILEY, Jonathan M. BORWEIN, Neil. J. CALKIN, Roland GIRGENSOHN, D. Russell LUKE, Victor H. MOLL. — **Experimental mathematics in action.** — Un vol. relié, 16×24, de XII, 322 p. — ISBN 978-1-56881-271-7. — Prix: US$49.00. — A.K. Peters, Wellesley, Massachusetts, 2007.

The last twenty years have been witness to a fundamental shift in the way mathematics is practiced. With the continued advance of computing power and accessibility, the view that "real mathematicians don't compute" no longer has any traction for a newer generation of mathematicians that can really take advantage of computer-aided research, especially given the scope and availability of modern computational packages such as Maple, Mathematica, and MATLAB. The authors provide a coherent variety of accessible examples of modern mathematics subjects in which intelligent computing plays a significant role.

David M. BRESSOUD. — **A radical approach to real analysis**. — Second edition. — Classroom resource materials. — Un vol. relié, 18,5×26,5, de XVI, 323 p. — ISBN 978-0-88385-747-2. — Prix: £27.99. — Mathematical Association of America, Washington, DC, distributed by Cambridge University Press, Cambridge, 2007.

In the second edition of this MAA classic, exploration continues to be an essential component. More than 60 new exercises have been added, and the chapters on Infinite Summations, Differentiability and Continuity, and Convergence of Infinite Series have been reorganized to make it easier to identify the key ideas. *A Radical Approach to Real Analysis* is an introduction to real analysis, rooted in and informed by the historical issues that shaped its development. It can be used as a textbook, or as a resource for the instructor who prefers to teach a traditional course, or as a resource for the student who has been through a traditional course yet still does not understand what real analysis is about and why it was created. The book begins with Fourier's introduction of trigonometric series and the problems they created for the mathematicians of the early 19th century. It follows Cauchy's attempts to establish a firm

foundation for calculus, and considers his failures as well as his successes. It culminates with Dirichlet's proof of the validity of the Fourier series expansion and explores some of the counterintuitive results Riemann and Weierstrass were led to as a result of Dirichlet's proof.

Gabor T. HERMAN, Attila KUBA, (Editors). — **Advances in discrete tomography and its applications.** — Applied and numerical harmonic analysis. — Un vol. relié, 16×24,5, de XX, 392 p. — ISBN 978-0-8176-3614-2. — Prix: SFr. 135.00. — Birkhäuser, Boston, 2007.

Advances in Discrete Tomography and its Applications is a unified presentation of new methods, algorithms, and select applications that are the foundations of multidimensional image reconstruction by discrete tomographic methods. The self-contained chapters, written by leading mathematicians, engineers, and computer scientists, present cutting-edge research and results in the field. Three main areas are covered: foundations, algorithms, and practical applications. Following an introduction that reports the recent literature of the field, the book explores various mathematical and computational problems of discrete tomography including new applications. *Topics and features*: Introduction to discrete point X-rays. — Uniqueness and additivity in discrete tomography. — Network flow algorithms for discrete tomography. — Convex programming and variational methods. — Applications to electron microscopy, materials science, nondestructive testing, and diagnostic medicine. Professionals, researchers, practitioners, and students in mathematics, computer imaging, biomedical imaging, computer science, and image processing will find the book to be a useful guide and reference to state-of-the-art research, methods, and applications.

Andreas K. HEYNE, Alice K. HEYNE (text), Elena S. PINI (illustrations). — **Leonhard Euler: a man to be reckoned with.** — English translation by Alice K. HEYNE and Tahu MATHESON. — Un vol. relié, 23,5×32, de 45 p. — ISBN 978-3-7643-8332-9. — Prix: SFr. 32.90. — Birkhäuser, Basel, 2007.

His ideas turned the mathematical world on its head. He calculated the currents of liquids, the moment of inertia, developed the calculus of variations and modern number theory. As scientist he should be placed on the same level as Newton and Einstein. Engineers all over the world use his formulas every day – whether it be for constructing the hull of the "Alinghi" or for calculating the vibrations of the "Viaduc de Millau", the world's highest motorway bridge. He was, however, a man who loved the peace and quiet of his home life – not easy at the time of the foundation of St. Petersburg, when murdering czars was daily business; or in Berlin at the time of the Silesian wars; and particularly not in the midst of a crowd of children. The comic follows the life of the genius from Basel, who, born 300 years ago, would set out to change the scientific world.

John Hamal HUBBARD, Barbara Burke HUBBARD. — **Vector calculus, linear algebra, and differential forms: a unified approach.** — 3rd edition. — Un vol. relié, 21×26,5, de XIV, 802 p. — ISBN 978-0-9715766-3-6. — Prix: US$ 78.00 — Matrix Editions, Ithaca, NY, 2007

This book is the third version of a book originally published in 1998. Chapters 1 through 6 cover the standard topics in multivariate calculus and a first course in linear algebra. The book can also be used for a course in analysis, using the proofs in the appendix. The organization and selection of material differs from the standard approach in three ways, reflecting the following guiding principles. First, we believe that at this level linear algebra should be more a convenient setting and language for multivariate calculus than a subject in its own right. The guiding principle of this unified approach is that, locally, a nonlinear function behaves like its derivative. Second, we emphasize computationally effective algorithms, and we prove theorems by showing

that these algorithms work. Third, we use differential forms to generalize the fundamental theorem of calculus to higher dimensions. The great conceptual simplification gained by doing electromagnetism in the language of forms is a central motivation for using forms.

Élise Janvresse, Thierry de La Rue. — **La loi des séries, hasard ou fatalité?** — Les petites pommes du savoir: des réponses brèves, claires et sérieuses aux questions que vous vous posez sur le monde. — Un vol. broché, 16×10, de 61 p. — ISBN 978-2-7465-0328-1. — Prix: €4.50. — Le Pommier, Paris, 2007.

La «malédiction Toutankhamon»: dans l'entourage des archéologues ayant participé aux fouilles du tombeau, on a, suivant les sources, compté de 20 à 35 décès dans les années qui suivirent. Autre série noire, en 1995, 5 avions se crashent en 22 jours. Dans le langage courant, la répétition de calamités a donné lieu à une expression dont les journalistes sont friands lorsqu'ils annoncent plusieurs catastrophes de nature similaire: la «loi des séries». Mais cette loi en est-elle une? Ces évènements dramatiques sont-ils vraiment le signe de la persécution du destin? Il est certes aisé d'invoquer une cause surnaturelle... mais si tout cela n'était que pures coïncidences? Comment déterminer si le hasard n'est pas venu mettre son grain de sel? C'est ici que la théorie des probabilités vient à notre rescousse... Une démonstration limpide, richement illustrée qui permet de suivre les raisonnements mathématiques à l'œuvre... et de tordre le cou à la «loi» des séries!

Owen O'Shea, Underwood Dudley. — **The magic numbers of the professor**. — Spectrum series. — Un vol. relié, 16×24, de xi, 168 p. — ISBN 978-0-88385-557-7. — Prix: £21.99. — Mathematical Association of America, Washington, DC, distributed by Cambridge University Press, Cambridge, 2007.

The Magic Numbers of the Professor is a fascinating collection of numerical curiosities and wonders. The Professor in Owen O'Shea's book is the imaginary American Richard Stein. As Owen O'Shea and the Professor travel through Ireland, O'Shea notes the Professor's collection of amazing magic numbers in fascinating detail. His mathematical curiosities are wide ranging, concerning the 1915 sinking of the Lusitania to coincidences about Apollo 11 to the first moon walk to new numerical curiosities. The new curiosities, among many others, center on Presidents Lincoln and Kennedy, the USA and Ireland, the two World Wars, the King James version of the Bible, and James Joyce. *The Magic Numbers of the Professor* reveals astonishing details about the year 1776, the year of American Independence. It contains discussions on prime numbers, gives some wonderful number patterns, and reveals many other eye-opening properties of numbers. It asks, for instance, if you know in how many different ways a US dollar can be changed. The Professor gives the answer to this and other currency questions. The number of the Beast, 666, is discussed as well, as are many new equations involving that famous number – all appearing here for the first time. And for those fascinated by games and gambling, a number of curious proposition bets involving dice, darts and playing cards, and various mathematical puzzles are scattered throughout this singularly entertaining book.

Marco Panza. — **Nombres: éléments de mathématiques pour philosophes.** — Cahiers d'histoire et de philosophie des sciences, vol. 53. — Un vol. broché, 14,5×21, de 470 p. — ISBN 978-2-84788-079-3. — Prix: €43.00. — Société française d'histoire des sciences et des techniques et ENS Éditions, Lyon, 2007.

Cet ouvrage répond à une double exigence: d'une part expliquer comment la construction de l'édifice mathématique se mêle à des questionnements philosophiques; de l'autre, offrir une introduction élémentaire aux théories mathématiques des nombres naturels, rationnels et réels. L'objectif est de présenter un modèle de rigueur dont le raisonnement philosophique devrait

pouvoir s'inspirer. Il a été écrit avec la conviction qu'aucune théorie mathématique ne peut être appréhendée sans que l'on comprenne le but qu'elle poursuit et les raisons qui la motivent. Même la plus formelle des théories, même le plus rigoureux des systèmes axiomatiques ne sont que l'expression de la structure logique d'une réalité. L'auteur cherche à montrer cette réalité et à reconstruire le parcours allant de celle-ci aux théories mathématiques qui l'expriment. De nombreuses notes historiques ponctuent le texte et ouvrent une perspective sur l'évolution de ces théories. Ecrit pour des étudiants en philosophie, le livre est également destiné à des étudiants de science, aux enseignants, et à tous ceux qui s'intéressent à l'histoire et à la philosophie des mathématiques.

David RUELLE. — **The mathematician's brain.** — Un vol. relié, 16,5 × 24, de IX, 160 p. — ISBN 978-0-691-12982-2. — Prix : £13.50. — Princeton University Press, Princeton, New Jersey, 2007.

The Mathematician's Brain poses a provocative question about the world's most brilliant yet eccentric mathematical minds: were they brilliant because of their eccentricities or in spite of them? In this thought-provoking and entertaining book, David Ruelle, the well-known mathematical physicist who helped create chaos theory, gives us a rare insider's account of the celebrated mathematicians he has known – their quirks, oddities, personal tragedies, bad behaviour, descents into madness, tragic ends, and the sublime, inexpressible beauty of their most breathtaking mathematical discoveries. Consider the case of British mathematician Alan Turing. Credited with cracking the German Enigma code during World War II and conceiving of the modern computer, he was convicted of "gross indecency" for a homosexual affair and died in 1954 after eating a cyanide-laced apple – his death was ruled a suicide, though rumors of assassination still linger. Ruelle holds nothing back in his revealing and deeply personal reflections on Turing and other fellow mathematicians, including Alexander Grothendieck, René Thom, Bernhard Riemann, and Felix Klein. But this book is more than a mathematical tell-all. Each chapter examines an important mathematical idea and the visionary minds behind it. Ruelle meaningfully explores the philosophical issues raised by each, offering insights into the truly unique and creative ways mathematicians think and showing how the mathematical setting is most favorable for asking philosophical questions about meaning, beauty, and the nature of reality. *The Mathematician's Brain* takes you inside the world – and heads – of mathematicians. It's a journey you won't soon forget.

Alan H. SCHOENFELD, (Editor). — **Assessing mathematical proficiency.** — Mathematical Sciences Research Institute publications, vol. 53. — Un vol. relié, 16,5 × 24,5, de XIX, 391 p. — ISBN 978-0-521-87492-2 (broché : 978-0-521-69766-8). — Prix : £45.00 (broché : £17.99). — Cambridge University Press, Cambridge, 2007.

Testing matters! It can determine kids' and schools' futures. In a conference at the Mathematical Sciences Research Institute, mathematicians, math education researchers, teachers, test developers, and policymakers gathered to work through critical issues related to mathematics assessment. They examined: the challenges of assessing student learning in ways that support instructional improvement; ethical issues related to assessment, including the impact of testing on urban and high-poverty schools; the different (and sometimes conflicting) needs of the different groups; and different frameworks, tools, and methods for assessment, comparing the kinds of information they offer about students' mathematical proficiency. This volume presents the results of the discussions. It highlights the kinds of information that different assessments can offer, including many examples of some of the best mathematics assessments worldwide. A special feature is an interview with a student about his knowledge of fractions, demonstrating what interviews (versus standardized tests) can reveal.

Lee SMOLIN. — **Rien ne va plus en physique! : l'échec de la théorie des cordes.** — Traduit de l'américain par Alexeï GRINBAUM. — Préface à l'édition française de Alain CONNES. — Quai des sciences. — Un livre broché, 24 × 15,5, de VII, 486 p. — ISBN 978-2-10-050702-3. — Prix : €24.90. — Dunod, Paris, 2007.

«La théorie des cordes n'a pas tenu ses promesses», affirme Lee Smolin qui fut pourtant lui-même partisan de cette approche. En effet, après plus de vingt ans de mobilisation des esprits et des crédits de recherche, parfois au détriment d'autres domaines de la physique, la théorie des cordes reste en réalité une simple conjecture. Les physiciens auraient-ils cédé aux sirènes d'une théorie élégante plutôt que de s'appuyer sur l'expérience et la complexité du réel? Il était grand temps de faire le point pour que le commun des mortels s'y retrouve. Lee Smolin expose en termes simples les théories physiques les plus récentes qui cherchent, sans encore y parvenir, à décrire totalement le fonctionnement de notre Univers. Théorie des cordes bien sûr, mais aussi gravité quantique à boucles, MOND (modified newtonian dynamics), relativité doublement restreinte, toutes sont confrontées aux «cinq grands problèmes de la physique contemporaine» identifiés par l'auteur.

Scott WALTER, Etienne BOLMONT, André CORET, (Éditeurs). — **La correspondance entre Henri Poincaré et les physiciens, chimistes et ingénieurs.** — Publications des archives Henri Poincaré. — Un vol. relié, 17,5 × 24, de XXII, 493 p. — ISBN 978-3-7643-7136-4. — Prix : SFr. 329.00. — Birkhäuser, Basel, 2007.

L'intérêt que portait Henri Poincaré (1854-1912) à des questions d'ordre physique a été durable et profond; il couvre presque toute sa carrière, et marque l'histoire de la physique tout au long du 20ème siècle. Sa correspondance avec cinquante et un physiciens, cinq chimistes, et cinq ingénieurs commence dès 1879, lorsqu'il s'engage activement dans la recherche scientifique. Elle est rythmée par des grandes découvertes d'ordre expérimental, instrumental, et théorique: la propagation dans l'air des ondes électromagnétiques et la théorie du résonateur des années 1880-90, les rayons X, la radioactivité, et l'effet Zeeman à la fin du 19ème siècle, la confirmation de l'effet Rowland, l'infirmation des rayons N, et l'élaboration de la théorie de la relativité au début du 20ème siècle, jusqu'à la démonstration de la nécessité de l'hypothèse des quanta (1912). Sa correspondance témoigne ainsi de la physique en marche pendant une période charnière de son histoire, mais également de sa structure institutionnelle, à travers des considérations de carrière (dont sa candidature au poste de secrétaire perpétuel des sciences physiques à l'Académie des sciences) et de récompenses (dont la candidature de Poincaré et d'autres au prix Nobel de physique). L'annotation des lettres rétablit le contexte des échanges et facilite la compréhension des enjeux aux niveaux théorique, expérimental, institutionnel et personnel, faisant de ce volume une ressource de grande valeur pour l'étude de Poincaré et de la science de son temps.

Umberto ZANNIER, (Editor). — **Colloquium De Giorgi 2006.** — Colloquia, vol. 1. — Un vol. broché, 15 × 24, de X, 57 p. — ISBN 978-88-7642-212-6. — Prix : €16.00. — Edizioni della Normale, Pisa, distributed by Birkhäuser, Basel, 2006.

Yuri F. Bilu: Diophantine equations with separated variables. — Corrado De Concini: Hopf algebras with trace and Clebsch-Gordan coefficients. — Simon Gindikin: The integral Cauchy formula on symmetric Stein manifolds. — Dorian Goldfeld: Historical reminiscences on the Gauss class number problem. — David Masser: From $2^{\sqrt{2}}$ to polarizations on Abelian varieties. — Zeév Rudnick: Eigenvalue statistics and lattice points. — Lucien Szpiro and Thomas J. Tucker: Algebraic dynamics.

Histoire

Klaus BEYER, (Hrsg.). — **Angewandte Analysis in Leipzig von 1922 bis 1985: in memoriam Herbert Beckert.** — Abhandlungen der Sächsischen Akademie der Wissenschaften zu Leipzig. Mathematisch-naturwissenschaftliche Klasse, Bd. 64, Heft 3. — Un vol. broché, 21×29,5, de 87 p. — ISBN 978-3-7776-1489-2. — Prix: €44.00. — Verlag der Sächsischen Akademie der Wissenschaften zu Leipzig, in Kommission bei S. Hirzel Stuttgart/Leipzig, 2007.

Die mathematische Forschung auf dem Gebiet der Analysis in Leipzig ist eng mit den Namen Leon Lichtensteins, Ernst Hölders und Herbert Beckerts verbunden. Alle drei waren herausragende Mathematiker und Hochschullehrer, die mit ihren Arbeiten weit über Leipzig hinaus wirkten. Der Band beleuchtet ausgewählte Forschungsgebiete, darunter freie Randwertprobleme, Wellenausbreitung in nichteuklidischen Räumen, Variationsrechnung, elliptische Differentialgleichungen und die Beckertsche Elastizitätstheorie. Auch die Erinnerungen Herbert Beckerts an Militärzeit und Studienjahre in Dresden und Leipzig sind aufgenommen. Seine kurzweiligen Beschreibungen der Assistenten- und Dozentenjahre bis zu seiner Berufung als ordentlicher Professor und Direktor des Leipziger Mathematischen Instituts runden den Band ab.

Victor KATZ, (Editor), Annette IMHAUSEN, Eleanor ROBSON, Joseph DAUBEN, Kim PLOFKER, J. Lennart BERGGREN. — **The mathematics of Egypt, Mesopotamia, China, India, and Islam: a sourcebook.** — Un vol. relié, 19×26,5, de XIV, 685 p. — ISBN 978-0-691-11485-9. — Prix: £44.95. — Princeton University Press, Princeton, 2007.

In recent decades it has become obvious that mathematics has always been a world-wide activity. But this is the first book to provide a substantial collection of English translations of key mathematical texts from the five most important ancient and medieval non-Western mathematical cultures, and to put them into full historical and mathematical context. The five section authors are experts in their fields. Each author has selected key texts and in many cases provided new translations. The authors have also written substantial section introductions that give an overview of each mathematical culture and explanatory notes that put each selection into context. This authoritative commentary allows readers to understand the sometimes unfamiliar mathematics of these civilizations and the purpose and significance of each text. Addressing a critical gap in the mathematics literature in English, this book is an essential resource for anyone with at least an undergraduate degree in mathematics who wants to learn about non-Western mathematical developments and how they helped shape and enrich world mathematics. The book is also an indispensable guide for mathematics teachers who want to use non-Western mathematical ideas in the classroom.

Elena Anne MARCHISOTTO, James T. SMITH. — **The legacy of Mario Pieri in geometry and arithmetic.** — Un vol. relié, 18,5×26, de XIX, 494 p. — ISBN 978-0-8176-3210-6. — Prix: SFr. 179.00. — Birkhäuser, Boston, 2007.

The Italian mathematician Mario Pieri (1860-1913) played an integral part in the research groups of Corrado Segre and Giuseppe Peano, and thus had a significant, yet somewhat underappreciated impact on several branches of mathematics, particularly on the development of algebraic geometry and the foundations of mathematics in the years around the turn of the 20th century. This book is the first in a series of three volumes that are dedicated to countering that neglect and comprehensively examining Pieri's life, mathematical work, and influence in such diverse fields as mathematical logic, algebraic geometry, number theory, inversive geometry, vector analysis, and differential geometry. *The Legacy of Mario Pieri in Geometry and*

Arithmetic introduces readers to Pieri's career and his studies in foundations, from both historical and modern viewpoints, placing his life and research in context and tracing his influence on his contemporaries as well as more recent mathematicians. The text also provides a glimpse of the Italian academic world of Pieri's time, and its relationship with the developing international mathematics community. Included in this volume are the first English translations, along with analyses, of two of his most important axiomatizations – his postulates for arithmetic, which Peano judged superior to his own, and his foundation of elementary geometry on the basis of point and sphere, which Alfred Tarski used as a basis for his own system. Combining an engaging exposition, little-known historical information, exhaustive references and an excellent index, this text will be of interest to graduate students, researchers, and historians with a general knowledge of logic and advanced mathematics, and it requires no specialized experience in mathematical logic or the foundations of geometry.

Albrecht PIETSCH. — **History of Banach spaces and linear operators.** — Un vol. relié, 16,5 × 24, de XXIII, 855 p. — ISBN 978-0-8176-4367-6. — Prix : SFr. 179.00. — Birkhäuser, Boston, 2007.

Named for Banach, one of the great mathematicians of the twentieth century, the concept of Banach spaces figures prominently in the study of functional analysis with applications to integral and differential equations, approximation theory, harmonic analysis, convex geometry, numerical mathematics, analytic complexity, and probability theory. Written by a distinguished specialist in functional analysis, this book presents a comprehensive treatment of the history of Banach spaces and (abstract bounded) linear operators. While other historical texts on the subject focus on developments before 1950, this one is mainly devoted to the second half of the 20th century. Banach space theory is presented in a broad mathematical context, using tools from such areas as set theory, topology, algebra, combinatorics, probability theory, and logic. Equal emphasis is given to both spaces and operators. Numerous examples and counterexamples elucidate the scope of the underlying concepts. As a stimulus for further research, the text also contains many problems which have not been previously solved. The book may serve as a reference for researchers and as an introduction for graduate students who want to learn Banach space theory with some historical flavor. Helpful information is also provided for professors preparing their own lectures on functional analysis.

Rudolf TASCHNER. — **Numbers at work: a cultural perspective.** — Translated by Otmar BINDER and David SINCLAIR-JONES. — Un vol. relié, 16 × 24, de X, 209 p. — ISBN 978-1-56881-290-8. — Prix : US$39.00. — A.K. Peters, Wellesley, Massachusetts, 2007.

In this colourfully illustrated historical guide, Rudolf Taschner takes the reader on a narrative journey through the lives of great figures throughout history who have been particularly aware of the connections between their fields and numbers, including Pythagoras, Bach, Hofmannsthal, Descartes, Leibniz, Laplace, Bohr, and Pascal. Along the way, he unearths the tremendous role that mathematics plays in all aspects of our culture, including music, astronomy, and politics. Using these historical figures and their cultural impact, we learn how numbers are at work in our daily lives. Originally published in German as *Der Zahlen gigantische Schatten* with great critical acclaim, this English translation by two involved readers is pleasing and easy to read while preserving the intellectual spirit of the original. A background in mathematics is not necessary to enjoy and learn from this book. All that is required is an interest in the world around us and a desire to understand the impact and influence that numbers have, both historically and in our daily lives.

Logique et fondements

Jouko VÄÄNÄNEN. — **Dependence logic : a new approach to independence friendly logic.** — London Mathematical Society student texts, vol. 70. — Un vol. broché, 15,5 × 23, de IX, 225 p. — ISBN 978-0-521-70015-3 (relié : 978-0-521-87659-9). — Prix : £ 23.99 (relié : £ 60.00). — Cambridge University Press, Cambridge, 2007.

Dependence is a common phenomenon wherever one looks: ecological systems, astronomy, human history, stock markets – but what is the logic of dependence? This book is the first to carry out a systematic logical study of this important concept, giving on the way a precise mathematical treatment of Hintikka's independence friendly logic. Dependence logic adds the concept of dependence to first-order logic. Here the syntax and semantics of dependence logic are studied, dependence logic is given an alternative game-theoretic semantics, and sharp results about its complexity are proven. This is a textbook suitable for a special course in logic in mathematics, philosophy, and computer science departments, and contains over 200 exercises, many of which have a full solution at the end of the book. It is also accessible to readers with a basic knowledge of logic, who are interested in new phenomena in logic.

Analyse combinatoire

Anthony HILTON, John TALBOT, (Editors). — **Surveys in combinatorics 2007.** — London Mathematical Society lecture note series, vol. 346. — Un vol. broché, 15,5 × 23, de VII, 286 p. — ISBN 978-0-521-69823-8. — Prix : £ 38.00. — Cambridge University Press, Cambridge, 2007.

This volume contains survey articles based on the invited lectures given at the Twenty-first British Combinatorial Conference, held in July 2007 at the University of Reading. This biennial conference is a well-established international event and the articles are of the high quality that befits the event. By its nature this volume provides an up-to-date overview of current research activity in several areas of combinatorics, ranging from graph theory to current applications of combinatorial mathematics, including efficient approximability of NP-hard optimization problems and cryptographic key management. The authors are some of the world's foremost researchers in their fields, and here they summarise existing results, and give a unique preview of work currently being written up. The book provides a valuable survey of the present state of knowledge in combinatorics. It will be useful to research workers and advanced graduate students, primarily in mathematics but also in computer science, statistics and engineering.

W.D. WALLIS. — **A beginner's guide to graph theory.** — Second edition. — Un vol. broché, 15,5 × 23,5, de XIX, 260 p. — ISBN 978-0-8176-4484-0. — Prix : SFr. 59.90. — Birkhäuser, Boston, 2007.

Graph theory continues to be one of the fastest growing areas of modern mathematics because of its wide applicability in such diverse disciplines as computer science, engineering, chemistry, management science, social science, and resource planning. Graphs arise as mathematical models in these fields, and the theory of graphs provides a spectrum of methods of proof. This concisely written textbook is intended for an introductory course in graph theory for undergraduate mathematics majors or advanced undergraduate and graduate students from the many fields that benefit from graph-theoretic applications. *Key features*: Introductory chapters present the main ideas and topics in graph theory – walks, paths and cycles, radius, diameter, eccentricity, cuts and connectivity, trees. — Subsequent chapters examine specialized topics

and applications. — Numerous examples and illustrations. — Comprehensive index and bibliography, with suggested literature for more advanced material. — *New to the second edition*: New chapters on labelling and on communications networks and small-worlds. — Expanded beginner's material in the early chapters, including more examples, exercises, hints and solutions to key problems. — Many additional changes, improvements, and corrections throughout resulting from classroom use and feedback. Striking a balance between a theoretical and practical approach with a distinctly applied flavour, this gentle introduction to graph theory consists of carefully chosen topics to develop graph-theoretic reasoning for a mixed audience. Familiarity with the basic concepts of set theory, along with some background in matrices and algebra, and a little mathematical maturity are the only prerequisites.

W.D. WALLIS. — **Introduction to combinatorial designs.** — Second edition. — Discrete mathematics and its applications. — Un vol. relié, 16,5 × 24,5, de XVI, 311 p. — ISBN 978-1-58488-838-3. — Prix: US$89.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2007.

Combinatorial theory is one of the fastest growing areas of modern mathematics. Focusing on a major part of this subject, *Introduction to Combinatorial Designs, second edition*, provides a solid foundation in the classical areas of design theory as well as in more contemporary designs based on applications in a variety of fields. After an overview of basic concepts, the text introduces balanced designs and finite geometries. The author then delves into balanced incomplete block designs, covering difference methods, residual and derived designs, and resolvability. Following a chapter on the existence theorem of Bruck, Ryser, and Chowla, the book discusses Latin squares, one-factorizations, triple systems, Hadamard matrices, and Room squares. It concludes with a number of statistical applications of designs. Reflecting recent results in design theory and outlining several applications, this new edition of a standard text presents a comprehensive look at the combinatorial theory of experimental designs. Suitable for a one-semester course or for self-study, it will prepare readers for further exploration in the field. — *Features*: Covers classical designs such as Latin squares, balanced incomplete block designs, and finite projective and affine planes; introduces modern extensions of design theory, including one-factorizations, Room squares, tournament designs, and nested designs; features applications in several areas, including cryptography, computer science, experimental design, and communications theory; includes instructive examples and theorems with every topic; provides exercises in each section, select answers in the back of the book, and more complete solutions on the author's website; contains references to classical literature to put results in a historical perspective.

Ordre, treillis

Ivan CHAJDA, Radomír HALAŠ, Jan KÜHR. — **Semilattice structures.** — Research and exposition in mathematics, vol. 30. — Un vol. broché, 17 × 24, de VI, 228 p. — ISBN 978-3-88538-230-0. — Prix: €28.00. — Heldermann Verlag, Lemgo, 2007.

Connections between logic and lattices were already mentioned by Garrett Birkhoff in his monograph "Lattice theory" published in 1940 and a number of books appeared since then on this topic discussing semilattices and semilattice structures however only marginally. The aim of our monograph is to remedy this situation by concentrating on semilattices and semilattice structures exclusively. We also discuss implication logics, but focus on the collection of descriptions and properties of the corresponding algebraic structures. We present many

known and new results, in particular on semilattices equipped with supplementary operations such as for example pseudocomplementation or relative pseudocomplementation and their generalizations. We believe that this book can be of considerable interest for algebraists working on semilattice structures or algebras related to logic as well as for logicians. We suppose that the book can initiate a further development of the topic and that it can in particular be useful for mathematicians starting to work in semilattice structures.

Théorie des nombres

Doug HENSLEY. — **Continued fractions**. — Un vol. relié, 16×23,5, de XIII, 245 p. — ISBN 981-256-477-2. — Prix : £47.00. — World Scientific, New Jersey, 2006.

The Euclidean algorithm is one of the oldest in mathematics, while the study of continued fractions as tools of approximation goes back at least to Euler and Legendre. While our understanding of continued fractions and related methods for simultaneous Diophantine approximation has burgeoned over the course of the past decade and more, many of the results have not been brought together in book form. Continued fractions have been studied from the perspective of number theory, complex analysis, ergodic theory, dynamic processes, analysis of algorithms, and even theoretical physics, which has further complicated the situation. This book places special emphasis on continued fraction Cantor sets and the Hausdorff dimension, algorithms and analysis of algorithms, and multi-dimensional algorithms for simultaneous Diophantine approximation. Extensive, attractive computer-generated graphics are presented, and the underlying algorithms are discussed and made available.

Mogens Esrom LARSEN. — **Summa summarum**. — CMS treatises in mathematics. — Un vol. relié, 16×24, de XII, 232 p. — ISBN 978-1-56881-323-3. — Prix : US$ 49.00. — Canadian Mathematical Society, Ottawa, Ontario, A.K. Peters, Wellesley, Massachusetts, 2007.

The ability to efficiently evaluate finite sums and combinatorial identities is a powerful tool for any mathematician or user of mathematics. As both a reference and an introduction to the art of manipulating sums for graduate and upper-level undergraduate students, researchers, and non-specialists, this book provides an array of systematic techniques that will help the reader to evaluate almost any finite algebraic sum. *Summa Summarum* includes discussions of many known sums and identities, a treatment of polynomial sums and linear difference equations, and a guide to classifying unknown sums and changing them to a standard form, in which they can be treated systematically. Along the way the reader is introduced to a number of essential tools, from the most classical ideas of Euler to recent effective computer algorithms by Gosper and by Wilf and Zeilberger.

Umberto ZANNIER, (Editor). — **Diophantine geometry : proceedings.** — CRM series, vol. 4. — Un vol. relié, 15×24, de XVII, 390 p. — ISBN 978-88-7642-206-5. — Prix : €25.00. — Edizioni della Normale, Pisa, distributed by Birkhäuser, Basel, 2007.

The book contains research papers on Diophantine geometry, written by participants to a related workshop held at the Centro De Giorgi of the Scuola Normale di Pisa during the period April-July 2005. The authors are eminent experts in the field; actually, several interacting subfields of the main topic are represented here, which is particularly useful to get a broad overview of recent research developments.

Corps et polynômes

H. SALZMANN, T. GRUNDHÖFER, H. HÄHL, R. LÖWEN. — **The classical fields: structural features of the real and rational numbers.** — Encyclopedia of mathematics and its applications, vol. 112. — Un vol. relié, 16,5 × 24, de XV, 401 p. — ISBN 978-0-521-86516-6. — Prix : £60.00. — Cambridge University Press, Cambridge, 2007.

The classical fields are the real, rational, complex, and p-adic numbers. Each of these fields comprises several intimately interwoven algebraic and topological structures. This compre-hensive volume analyzes the interaction and interdependencies of these different aspects. The real and rational numbers are examined additionally with respect to their orderings, and these fields are compared with their non-standard counterparts. Typical substructures and quotients, relevant automorphism groups, and many counter-examples are described. Also discussed are completion procedures of chains and of ordered and topological groups, with applications to classical fields. The p-adic numbers are placed in the context of general topological fields: absolute values, valuations and the corresponding topologies are studied, and the classification of all locally compact fields and skew fields is presented. Exercises are provided with hints and solutions at the end of the book. An appendix reviews ordinals and cardinals, duality theory of locally compact Abelian groups and various constructions of fields.

Géométrie algébrique

Brendan HASSETT. — **Introduction to algebraic geometry**. — Un vol. broché, 17,5 × 24,5, de XII, 252 p. — ISBN 978-0-521-69141-3 (relié : 978-0-521-87094-8). — Prix : £19.99 (relié : £55.00). — Cambridge University Press, Cambridge, 2007.

Algebraic geometry has a reputation for being difficult and inaccessible, even among mathematicians! This must be overcome. The subject is central to pure mathematics, and applications in fields like physics, computer science, statistics, engineering, and computational biology are increasingly important. This book is based on courses given at Rice University and the Chinese University of Hong Kong, introducing algebraic geometry to a diverse audience consisting of advanced undergraduate and beginning graduate students in mathematics, as well as researchers in related fields. For readers with a grasp of linear algebra and elementary abstract algebra, the book covers the fundamental ideas and techniques of the subject and places these in a wider mathematical context. However, a full understanding of algebraic geometry requires a good knowledge of guiding classical examples, and this book offers numerous exercises fleshing out the theory. It introduces Gröbner bases early on and offers algorithms for most every technique described. Both students of mathematics and researchers in related areas benefit from the emphasis on computational methods and concrete examples.

Rolf-Peter HOLZAPFEL, A. Muhammed ULUDAĞ, Masaaki YOSHIDA, (Editors). — **Arithmetic and geometry around hypergeometric functions: lecture notes of a CIMPA Summer School held at Galatasaray University, Istanbul, 2005.** — Progress in mathematics, vol. 260. — Un vol. relié, 16 × 24, de VIII, 437 p. — ISBN 978-3-7643-8283-4. — Prix : SFr. 135.00. — Birkhäuser, Basel, 2007

This volume contains lecture notes, a survey article, research articles, and the results of a problem session. Key topics are moduli spaces of points on P1 and Picard-Terada-Deligne-Mostow theory, moduli spaces of K3 surfaces, complex hyperbolic geometry, ball quotients,

GKZ hypergeometric structures, Hilbert and Picard modular surfaces, uniformizations of complex orbifolds, algebraicity of values of Schwartz triangle functions, and Thakur's hypergeometric function. The book provides a background, gives detailed expositions and indicates new research directions. It is directed to postgraduate students and researchers.

Ilia ITENBERG, Grigory MIKHALKIN, Eugenii SHUSTIN. — **Tropical algebraic geometry.** — Oberwolfach seminars, vol. 35. — Un vol. broché, 17×24, de VIII, 103 p. — ISBN 978-3-7643-8309-1. — Prix : SFr. 32.90. — Birkhäuser, Basel, 2007.

Tropical geometry is algebraic geometry over the semifield of tropical numbers, i.e., the real numbers and negative infinity enhanced with the (max,+)- arithmetics. Geometrically, tropical varieties are much simpler than their classical counterparts. Yet they carry information about complex and real varieties. These notes present an introduction to tropical geometry and contain some applications of this rapidly developing and attractive subject. It consists of three chapters which complete each other and give a possibility for non-specialists to make the first steps in the subject which is not yet well represented in the literature. The intended audience is graduate, post-graduate, and PhD students as well as established researchers in mathematics.

Jan NAGEL, Chris PETERS, (Editors). — **Algebraic cycles and motives, vol. 2**. — London Mathematical Society lecture note series, vol. 344. — Un vol. broché, 15,5×23, de XIV, 359 p. — ISBN 978-0-521-70175-4. — Prix : £40.00. — Cambridge University Press, Cambridge, 2007

Algebraic geometry is a central subfield of mathematics in which the study of cycles is an important theme. Alexander Grothendieck taught that algebraic cycles should be considered from a motivic point of view and in recent years this topic has spurred a lot of activity. This book is one of two volumes that provide a self-contained account of the subject as it stands today. Together, the two books contain 22 contributions from leading figures in the field, which survey the key research strands and present interesting new results. Topics discussed include : the study of algebraic cycles using Abel-Jacobi/regulator maps and normal functions; motives (Voevodsky's triangulated category of mixed motives, finite-dimensional motives); the conjectures of Bloch-Beilinson and Murre on filtrations on Chow groups and Bloch's conjecture. Researchers and students in complex algebraic geometry and arithmetic geometry will find much of interest here.

Irena PEEVA, (Editor). — **Syzygies and Hilbert functions.** — Lecture notes in pure and applied mathematics, vol. 254. — Un vol. broché, 15,5×23,5, de 293 p. — ISBN 978-1-58488-860-4. — Prix : US$ 169.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2007.

Hilbert functions and resolutions are both central objects in commutative algebra and fruitful tools in the fields of algebraic geometry, combinatorics, commutative algebra, and computational algebra. Spurred by recent research in this area, *Syzygies and Hilbert Functions* explores fresh developments in the field as well as fundamental concepts. Written by international mathematics authorities, the book first examines the invariant of Castelnuovo-Mumford regularity, blowup algebras, and bigraded rings. It then outlines the current status of two challenging conjectures: the lex-plus-power (LPP) conjecture and the multiplicity conjecture. After reviewing results of the geometry of Hilbert functions, the book considers minimal free resolutions of integral subschemes and of equidimensional Cohen-Macaulay subschemes of small degree. It also discusses relations to subspace arrangements and the properties of the infinite graded minimal free resolution of the ground field over a projective toric ring. The volume closes with an introduction to multigraded Hilbert functions, mixed multiplicities, and joint reductions. By surveying exciting topics of vibrant current research, *Syzygies and Hilbert Functions* stimulates further study in this hot area of mathematical activity.

— *Features*: Presents highlights, conjectures, unsolved problems, and examples of Hilbert functions and resolutions; covers topics at the interface of commutative algebra, algebraic geometry, and combinatorics; discusses the important invariant of Castelnuovo-Mumford regularity; surveys two challenging conjectures: the LPP conjecture and the multiplicity conjecture; describes bigraded rings, multigraded rings, and toric rings.

Mihai TIBĂR. — **Polynomials and vanishing cycles.** — Cambridge tracts in mathematics, vol. 170. — Un vol. relié, 16×23,5, de XII, 253 p. — ISBN 978-0-521-82920-5. — Prix: £45.00. — Cambridge University Press, Cambridge, 2007.

The behavior of vanishing cycles is the cornerstone for understanding the geometry and topology of families of hypersurfaces, usually regarded as singular fibrations. This self-contained Tract proposes a systematic geometro-topological approach to vanishing cycles, especially those appearing in non-proper fibrations, such as the fibration defined by a polynomial function. Topics which have been the object of active research especially over the past 15 years, such as holomorphic and mesomorphic germs, polynomial functions, and Lefschetz pencils on quasi-projective spaces, are here shown in a new light: conceived as aspects of a single theory with vanishing cycles at its core. Throughout the book the author presents the current state of the art. Transparent proofs are provided so that non-specialists can use this book as an introduction, but all researchers and graduate students working in differential and algebraic topology, algebraic geometry, and singularity theory will find this book of great use.

Anneaux et algèbres

Matej BREŠAR, Mikhail A. CHEBOTAR, Wallace S. MARTINDALE 3rd. — **Functional identities.** — Frontiers in mathematics. — Un vol. broché, de XII, 272 p. — ISBN 978-3-7643-7795-3. — Prix: SFr. 65.00. — Birkhäuser, Basel, 2007.

The theory of functional identities (FIs) is a relatively new one – the first results were published at the beginning of the 1990s, and this is the first book on this subject. An FI can be informally described as an identical relation involving arbitrary elements in an associative ring together with arbitrary (unknown) functions. The goal of the general FI theory is to describe these functions, or, when this is not possible, to describe the structure of the ring admitting the FI in question. This abstract theory has turned out to be a powerful tool for solving a variety of problems in ring theory, Lie algebras, Jordan algebras, linear algebra, and operator theory. The book is divided into three parts. Part I is an introductory one. Part II is the core of the book. It gives a full account of the general FI theory, which is based on the concept of a d-free set; various constructions and concrete examples of d-free sets are given, and FIs on d-free sets are thoroughly studied. Part III deals with applications. Its main purpose is to demonstrate how one can find FI's when considering different problems, and then effectively use the general theory exposed in Part II. Perhaps the most illuminating example of the applicability are solutions of long-standing Herstein's conjectures on Lie homomorphisms and Lie derivations – in the proofs practically the entire FI theory is used.

Mikhail CHEBOTAR, Yuen FONG, Wen-Fong KE, Pjek-Hwee LEE, (Editors). — **Rings and nearrings: proceedings of the International Conference of Algebra in memory of Kostia Beidar, Tainan, Taiwan, March 6-12, 2005**. — Un vol. relié, 17,5×24,5, de 167 p. — ISBN 978-3-11-019952-9. — Prix: €119.63. — Walter de Gruyter, Berlin, 2007.

This volume consists of seven papers related in various matters to the research work of Kostia Beidar, a distinguished ring theorist and professor of National Cheng Kung University

(NCKU). Written by leading experts in these areas, the papers also emphasize important applications to other fields of mathematics. Most papers are based on talks that were presented at the memorial conference which was held in March 2005 in NCKU.

Mohamed ELKADI, Bernard MOURRAIN. — **Introduction à la résolution des systèmes polynomiaux.** — Mathématiques & applications, vol. 59. — Un vol. broché, 15,5×23,5, de 305 p. — ISBN 978-3-540-71646-4. — Prix : €59.83. — Springer, Berlin, 2007.

Les équations polynomiales apparaissent dans de nombreux domaines, pour modéliser des contraintes géométriques, des relations entre des grandeurs physiques, ou encore des propriétés satisfaites par certaines inconnues. Cet ouvrage est une introduction aux méthodes algébriques permettant de résoudre ce type d'équations. Nous montrons comment la géométrie des variétés algébriques définies par ces équations, leur dimension, leur degré, ou leurs composantes peuvent se déduire des propriétés des algèbres quotients correspondantes. Nous abordons pour cela des méthodes de la géométrie algébrique effective, telles que les bases de Gröbner, la résolution par valeurs et vecteurs propres, les résultants, les bézoutiens, la dualité, les algèbres de Gorenstein et les résidus algébriques. Ces méthodes sont accompagnées d'algorithmes, d'exemples et d'exercices, illustrant leurs applications.

Leonid A. KURDACHENKO, Javier OTAL, Igor Ya. SUBBOTIN. — **Artinian modules over group rings.** — Frontiers in mathematics. — Un vol. broché, 17×24, de XII, 247 p. — ISBN 978-3-7643-7764-9. — Prix : SFr. 68.00. — Birkhäuser, Basel, 2007.

This book highlights important developments on Artinian modules over group rings of generalized nilpotent groups. Along with traditional topics such as direct decompositions of Artinian modules, criteria of complementability for some important modules, and criteria of semisimplicity of Artinian modules, it also focuses on recent advanced results on these matters. The theory of modules over groups has its own specific character that plays an imperative role here and, for example, allows a significant generalization of the classical Maschke Theorem on some classes of infinite groups. Conversely, it leads to establishing direct decompositions of Artinian modules related to important natural formations, which, in turn, find very efficient applications in infinite groups. As self-contained as possible, this book will be useful for students as well as for experts in group theory, ring theory, and module theory.

Susumu ODA, Ken-ichi YOSHIDA. — **Simple extensions with the minimum degree relations of integral domains.** — Lecture notes in pure and applied mathematics, vol. 253. — Un vol. broché, 15,5×23,5, de 277 p. — ISBN 978-1-58488-851-2. — Prix : US$ 169.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2007.

Covering an understudied aspect of commutative algebra, *Simple Extensions with the Minimum Degree Relations of Integral Domains* presents a comprehensive treatment of various simple extensions and their properties. In particular, it examines several properties of simple ring extensions of Noetherian integral domains. As experts who have been studying this field for over a decade, the authors present many arguments that they have developed themselves, mainly exploring anti-integral, super-primitive, and ultra-primitive extensions. Within this framework, they study certain properties, such as flatness, integrality, and unramifiedness. Some of the topics discussed include Sharma polynomials, vanishing points, Noetherian domains, denominator ideals, unit groups, and polynomial rings. Presenting a complete treatment of each topic, *Simple Extensions with the Minimum Degree Relations of Integral Domains* serves as an

ideal resource for graduate students and researchers involved in the area of commutative algebra. — *Features*: Focuses on simple algebraic extensions that satisfy certain conditions; shows that simple extensions of a Noetherian domain R can be complicated even if they are birationally equal to R; presents some fundamental concepts of commutative algebra; provides numerous recent mathematical results and facts, enabling readers to keep abreast of developments in this area of ongoing research.

Daniel SIMSON, Andrzej SKOWROŃSKI. — **Elements of the representation theory of associative algebras. Volume 2: tubes and concealed algebras of Euclidean type.** — London Mathematical Society student texts, vol. 71. — Un vol. broché, 15,5 × 23, de XII, 308 p. — ISBN 978-0-521-54420-7 (relié : 978-0-521-83610-4). — Prix : £27.99 (relié : £65.00). — Cambridge University Press, Cambridge, 2007.

The second of a three-volume set providing a modern account of the representation theory of finite dimensional associative algebras over an algebraically closed field. The subject is presented from the perspective of linear representations of quivers, geometry of tubes of indecomposable modules and homological algebra. This volume provides an up-to-date introduction to the representation theory of the representation-infinite hereditary algebras of Euclidean type, as well as to concealed algebras of Euclidean type. In particular, it contains a detailed description of the indecomposable modules, module categories and the Auslander-Reiten quivers over such algebras using the theory of almost split sequences, the tilting theory, integral quadratic forms, and the geometry of tubes. Much of this material has never appeared before in book form. The book is primarily addressed to a graduate student starting research in the representation theory of algebras, but it will also be of interest to mathematicians in other fields. The text includes many illustrative examples and a large number of exercises at the end of each of the chapters. Proofs are presented in complete detail, making the book suitable for courses, seminars and self-study.

Daniel SIMSON, Andrzej SKOWROŃSKI. — **Elements of the representation theory of associative algebras. Volume 3: representation-infinite tilted algebras.** — London Mathematical Society student texts, vol. 72. — Un vol. broché, 15,5 × 23, de XI, 456 p. — ISBN 978-0-521-70876-0 (relié : 978-0-521-88218-7). — Prix : £29.99 (relié : £70.00). — Cambridge University Press, Cambridge, 2007.

The third of a three-volume set providing a modern account of the representation theory of finite dimensional associative algebras over an algebraically closed field. The subject is presented from the perspective of linear representations of quivers and homological algebra. This volume provides an introduction to the representation theory of representation-infinite tilted algebras from the point of view of the tame-wild dichotomy. It contains a complete description of the representation-infinite tilted algebras of Euclidean type and a detailed discussion of the wild behaviour of the module categories over wild hereditary algebras. Also included is a collection of selected results relating to the material discussed in all three volumes, giving new perspectives for future study. The book is addressed primarily to a graduate student starting research in the representation theory of algebras, but will also be of interest to mathematicians in other fields. Proofs are presented in complete detail, and the text includes many illustrative examples and a large number of exercises at the end of each chapter, making the book suitable for courses, seminars and self-study.

Théorie des groupes et généralisations

Goulnara N. ARZHANTSEVA, Laurent BARTHOLDI, José BURILLO, Enric VENTURA, (Editors). — **Geometric group theory: Geneva and Barcelona conferences.** — Trends in mathematics. — Un vol. relié, 17×24, de 253 p. — ISBN 978-3-7643-8411-1. — Prix: SFr. 179.00. — Birkhäuser, Basel, 2007.

This volume assembles research papers in geometric and combinatorial group theory. This wide area may be defined as the study of those groups that are defined by their action on a combinatorial or geometric object, in the spirit of Klein's programme. The contributions range over a wide spectrum: limit groups, groups associated with equations, with cellular automata, their structure as metric objects, their decomposition, etc. Their common denominator is the language of group theory, used to express and solve problems ranging from geometry to logic. — Contributors: Udo Baumgartner, José Burillo, Tullio Ceccherini-Silberstein, Sean Cleary, Michel Coornaert, Yves de Cornulier, Pierre de la Harpe, Ramón J. Flores, Vincent Guirardel, Arye Juhász, Gilbert Levitt, Martin Lustig, Avinoam Mann, Alexei Miasnikov, Abderezak Ould Houcine, Enric Ventura, Pascal Weil, Bert Wiest.

Rolf BERNDT. — **Representations of linear groups: an introduction based on examples from physics and number theory.** — Un vol. broché, 17×24, de 270 p. — ISBN 978-3-8348-0319-1. — Prix: €39.90. — Vieweg, Wiesbaden, 2007.

This is an elementary introduction to the representation theory of real and complex matrix groups. The text is written for students in mathematics and physics who have a good knowledge of differential/integral calculus and linear algebra and are familiar with basic facts from algebra, number theory and complex analysis. The goal is to present the fundamental concepts of representation theory, to describe the connection between them, and to explain some of their background. The focus is on groups which are of particular interest for applications in physics and number theory (e.g. Gell-Mann's eightfold way and theta functions, automorphic forms). The reader finds a large variety of examples which are presented in detail and from different points of view. The examples motivate the general theory well covered already by the existing literature. Hence for complete proofs of most of the essential statements and theorems the reader is often referred to the standard sources. Plenty of exercises are included in the text. Some of these exercises and/or omitted proofs may give a starting point for a bachelor thesis and further studies in a master program.

Theodore G. FATICONI. — **Direct sum decompositions of torsion-free finite rank groups.** — Pure and applied mathematics, vol. 285. — Un vol. relié, 16×23,5, de XXI, 315 p. — ISBN 978-1-58488-726-3. — Prix: US$99.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2007.

With plenty of new material not found in other books, *Direct Sum Decompositions of Torsion-Free Finite Rank Groups* explores advanced topics in direct sum decomposition of Abelian groups and their consequences. The book illustrates a new way of studying these groups while still honoring the rich history of unique direct sum decompositions of groups. — *Key features*: Uses modern algebraic number theory to answer questions concerning the isomorphism of locally isomorphic rtffr groups; discusses direct sum decompositions of rtffr groups using $A(.)$; employs the localization theory in S to study $E(G)$; examines commutative endomorphism rings of rtffr groups-rings that have often been overlooked in the literature; characterizes rtffr groups G that satisfy the Baer splitting property; discusses J-groups, L-groups, and S-groups; investigates possible homological dimensions of the left End(G)-module G; contains abundant examples and exercises to reinforce the concepts.

Fonctions de variables réelles

D.J.H. GARLING. — **Inequalities: a journey into linear analysis.** — Un vol. broché, 17,5×25, de IX, 335 p. — ISBN 978-0-521-69973-0 (relié : 978-0-521-87624-7). — Prix : £23.99 (relié : £60.00). — Cambridge University Press, Cambridge, 2007.

Inequalities : a Journey into Linear Analysis contains a wealth of inequalities used in linear analysis, and explains in detail how they are used. The book begins with Cauchy's inequality and ends with Grothendieck's inequality ; in-between one finds the Loomis-Whitney inequality, maximal inequalities, inequalities of Hardy and of Hilbert, hypercontractive and logarithmic Sobolev inequalities, Beckner's inequality, and many, many more. The inequalities are used to obtain properties of function spaces, linear operators between them, and of special classes of operators such as absolutely summing operators. This textbook complements and fills out standard treatments, providing many diverse applications: for example, the Lebesgue decomposition theorem and the Lebesgue density theorem, the Hilbert transform and other singular integral operators, the martingale convergence theorem, eigenvalue distributions, Lidskii's trace formula, Mercer's theorem and Littlewood's 4/3 theorem. It will broaden the knowledge of postgraduate and research students, and should also appeal to their teachers, and to all who work in linear analysis.

Fonctions d'une variable complexe

Kunihiko KODAIRA. — **Complex analysis.** — Transl. by A. SEVENSTER. — Cambridge studies in advanced mathematics, vol. 107. — Un vol. relié, 16×23,5, de IX, 406 p.— ISBN 978-052-1-80937-5. — Prix : £40.00. — Cambridge University Press, Cambridge, 2007.

Written by a master of the subject, this textbook will be appreciated by students and experts. The author develops the classical theory of functions of a complex variable in a clear and straightforward manner. In general, the approach taken here emphasizes geometrical aspects of the theory in order to avoid some of the topological pitfalls associated with this subject. Thus, Cauchy's integral formula is first proved in a topologically simple case from which the author deduces the basic properties of holomorphic functions. Starting from the basics, students are led on to the study of conformal mappings, Riemann's mapping theorem, analytic functions on a Riemann surface, and ultimately the Riemann-Roch and Abel theorems. Profusely illustrated and with plenty of examples, and problems (solutions to many of which are included), this book should be a stimulating text for advanced courses in complex analysis.

Fonctions de plusieurs variables complexes

Xiaonan MA, George MARINESCU. — **Holomorphic Morse inequalities and Bergman kernels.** — Progress in mathematics, vol. 254. — Un vol. relié, 16,5×24, de XIII, 422 p. — ISBN 978-3-7643-8096-0. — Prix : SFr. 105.00. — Birkhäuser, Basel, 2007.

This book gives for the first time a self-contained and unified approach to holomorphic Morse inequalities and the asymptotic expansion of the Bergman kernel on manifolds by using the heat kernel, and presents also various applications. The main analytic tool is the analytic localization technique in local index theory developed by Bismut-Lebeau. The book includes the most recent results in the field and therefore opens perspectives on several active areas of research in complex, Kähler and symplectic geometry. A large number of applications are

included, e.g., an analytic proof of the Kodaira embedding theorem, a solution of the Grauert-Riemenschneider and Schiffman conjectures, a compactification of complete Kähler manifolds of pinched negative curvature, the Berezin-Toeplitz quantization, weak Lefschetz theorems, and the asymptotics of the Ray-Singer analytic torsion.

Edgar Lee STOUT. — **Polynomial convexity.** — Progress in mathematics, vol. 261. — Un vol. relié, 16×24, de X, 439 p. — ISBN 978-0-8176-4537-3. — Prix: SFr. 119.00. — Birkhäuser, Boston, 2007.

This comprehensive monograph is devoted to the study of polynomially convex sets, which play an important role in the theory of functions of several complex variables. Important features of *Polynomial Convexity*: presents the general properties of polynomially convex sets with particular attention to the theory of the hulls of one-dimensional sets; motivates the theory with numerous examples and counter-examples, which serve to illustrate the general theory and to delineate its boundaries; examines in considerable detail questions of uniform approximation, especially on totally real sets, for the most part on compact sets but with some attention to questions of global approximation on noncompact sets; discusses important applications, e.g., to the study of analytic varieties and to the theory of removable singularities for CR functions; requires of the reader a solid background in real and complex analysis together with some previous experience with the theory of functions of several complex variables as well as the elements of functional analysis.

Équations différentielles ordinaires

Vladimir BURD. — **Method of averaging for differential equations on an infinite interval: theory and applications.** — Lecture notes in pure and applied mathematics, vol. 255. — Un vol. broché, 15,5×23,5, de XII, 343 p. — ISBN 978-1-58488-874-1. — Prix: US$ 169.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2007.

In recent years, mathematicians have detailed simpler proofs of known theorems, have identified new applications of the method of averaging, and have obtained many new results of these applications. Encompassing these novel aspects, *Method of Averaging for Differential Equations on an Infinite Interval: Theory and Applications* rigorously explains the modern theory of the method of averaging and provides a solid understanding of the results obtained when applying this theory. The book starts with the less complicated theory of averaging linear differential equations (LDEs), focusing on almost periodic functions. It describes stability theory and Shtokalo's method, and examines various applications, including parametric resonance and the construction of asymptotics. After establishing this foundation, the author goes on to explore nonlinear differential equations. He studies standard form systems in which the right-hand side of a system is proportional to a small parameter and proves theorems similar to Banfi's theorem. The final chapters are devoted to systems with a rapidly rotating phase. Covering an important asymptotic method of differential equations, this book provides a thorough understanding of the method of averaging theory and its resulting applications. — *Features*: Introduces periodic and almost periodic functions; applies the theory to a parametric resonance problem and the construction of asymptotics for LDEs with oscillatory decreasing coefficients; presents the results of the stabilization of Chelomei's pendulum and a pendulum with slowly decreasing oscillations of the pivot; provides exercises that help with the study of applied problems; contains useful facts about almost periodic functions, stability theory, and functional analysis in the appendices.

Équations aux dérivées partielles

David G. COSTA. — **An invitation to variational methods in differential equations.** — Un vol. broché, 15,5×23,5, de XII, 138 p. — ISBN 978-0-8176-4535-9. — Prix: SFr. 65.00. — Birkhäuser, Boston, 2007.

This book is a short introductory text to variational techniques with applications to differential equations. It presents a sampling of topics in critical point theory with applications to existence and multiplicity of solutions in nonlinear problems involving ordinary differential equations (ODEs) and partial differential equations (PDEs). Five simple problems in ODEs which illustrate existence of solutions from a variational point of view are introduced in the first chapter. These problems set the stage for the topics covered, including minimization, deformation results, the mountain-pass theorem, the saddle-point theorem, critical points under constraints, a duality principle, critical points in the presence of symmetry, and problems with lack of compactness. Each topic is presented in a straightforward manner, and followed by one or two illustrative applications. The concise, straightforward, user-friendly approach of this textbook will appeal to graduate students and researchers interested in differential equations, analysis, and functional analysis.

Approximations et développements en série

Larry L. SCHUMAKER. — **Spline functions: basic theory.** — Third edition. — Cambridge mathematical library. — Un vol. broché, 15,5×23, de XV, 582 p. — ISBN 978-0-521-70512-7. — Prix: £30.00. — Cambridge University Press, Cambridge, 2007.

The latest edition of this classic work continues to offer a comprehensive treatment of the theory of univariate and tensor-product splines. It will be of interest to researchers and students working in applied analysis, numerical analysis, computer science, and engineering. The material covered provides the reader with the necessary tools for understanding the many applications of splines in such diverse areas as approximation theory, computer-aided geometric design, curve and surface design and fitting, image processing, numerical solution of differential equations, and increasingly in business and the biosciences. The book begins with results on polynomials and polynomial splines, including computational methods and a thorough discussion of approximation power. It goes on to discuss various generalizations, including discrete splines, trigonometric splines, L-splines, Tchebycheffian splines, and other forms of generalized splines. Tensor-product splines are also treated. The new edition includes a supplement outlining some of the major advances in the theory since 1981, and some 250 new references. It can be used as the main or supplementary text for courses in splines, approximation theory, or numerical analysis.

Analyse fonctionnelle

Karim BOULABIAR, Gerard BUSKES, Abdelmajid TRIKI, (Editors). — **Positivity.** — Trends in mathematics. — Un vol. relié, 17,5×24, de 279 p. — ISBN 978-3-7643-8477-7. — Prix: SFr. 169.00. — Birkhäuser, Basel, 2007.

B. Banerjee and M. Henriksen: Ways in which $C(X)$ mod a prime ideal can be a valuation domain; something old and something new. — D.P. Blecher: Positivity in operator algebras and operator spaces. — K. Boulabiar, G. Buskes, and A. Triki: Results in f-algebras. — Q. Bu, G. Buskes, and A.G. Kusraev: Bilinear maps on products of vector lattices: a survey. — G.P.

Curbera and W.J. Ricker: Vector measures, integration and applications. — J. Martínez: The role of frames in the development of lattice-ordered groups: a personal account. — B. de Pagter: Non-commutative Banach function spaces. — A.R. Schep: Positive operators on L^p-spaces. — A.W. Wickstead: Regular operators between Banach lattices.

Joachim Cuntz, Ralf Meyer, Jonathan M. Rosenberg. — **Topological and bivariant K-theory.** — Oberwolfach seminars, vol. 36. — Un vol. broché, 17×24, de xi, 262 p. — ISBN 978-3-7643-8398-5. — Prix: SFr. 49.90. — Birkhäuser, Basel, 2007.

Topological K-theory is one of the most important invariants for noncommutative algebras equipped with a suitable topology or bornology. Bott periodicity, homotopy invariance, and various long exact sequences distinguish it from algebraic K-theory. We describe a bivariant K-theory for bornological algebras, which provides a vast generalization of topological K-theory. In addition, we discuss other approaches to bivariant K-theories for operator algebras. As applications, we study K-theory of crossed products, the Baum-Connes assembly map, twisted K-theory with some of its applications, and some variants of the Atiyah-Singer index theorem.

Pavel Drábek, Jaroslav Milota. — **Methods of nonlinear analysis: applications to differential equations.** — Birkhäuser advanced texts. — Un vol. relié, 17,5×24, de xii, 568 p. — ISBN 978-3-7643-8146-2. — Prix: SFr. 119.00. — Birkhäuser, Basel, 2007.

In this book, fundamental methods of nonlinear analysis are introduced, discussed and illustrated in straightforward examples. Every method considered is motivated and explained in its general form, but presented in an abstract framework as comprehensively as possible. Applications and generalizations are shown. In particular, a large number of methods is applied to boundary value problems for partial differential equations. The text is structured in two levels: a self-contained basic level and an advanced level – organized in appendices – for the more experienced reader. It thus serves as both a textbook for graduate-level courses and a reference book for mathematicians, engineers and applied scientists.

Lieven Le Bruyn. — **Noncommutative geometry and Cayley-smooth orders.** — Pure and applied mathematics, vol. 290. — Un vol. relié, 16,5×24,5, de lxiii, 524 p. — ISBN 978-1-4200-6422-3. — Prix: US$99.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2008.

Noncommutative Geometry and Cayley-smooth Orders explains the theory of Cayley-smooth orders in central simple algebras over function fields of varieties. In particular, the book describes the étale local structure of such orders as well as their central singularities and finite dimensional representations. After an introduction to partial desingularizations of commutative singularities from noncommutative algebras, the book presents the invariant theoretic description of orders and their centers. It proceeds to introduce étale topology and its use in noncommutative algebra as well as to collect the necessary material on representations of quivers. The subsequent chapters explain the étale local structure of a Cayley-smooth order in a semisimple representation, classify the associated central singularity to smooth equivalence, describe the nullcone of these marked quiver representations, and relate them to the study of all isomorphism classes of n-dimensional representations of a Cayley-smooth order. The final chapters study Quillen-smooth algebras via their finite dimensional representations. *Noncommutative Geometry and Cayley-smooth Orders* provides a gentle introduction to one of mathematics' and physics' hottest topics. — *Features*: Presents background information on a variety of topics, including invariant theory, algebraic geometry, and central simple algebras; discusses the use of étale topology in noncommutative algebra, such as Azumaya algebras and algebras via Luna slices; explores the indecomposable roots of quivers, the determination of dimension vectors of simple representations, and the results on general quiver representations; contains the main results on Cayley-

smooth orders, including semisimple and nilpotent representations; provides an introduction to the fast developing theory of Quillen-smooth algebras.

Beata RANDRIANANTOANINA, Narcisse RANDRIANANTOANINA, (Editors). — **Banach spaces and their applications in analysis: proceedings of the International Conference at Miami University, May 22-27, 2006, in honor of Nigel Kalton's 60th birthday.** — Un vol. relié, 18×24,5, de IX, 453 p. — ISBN 978-3-11-019449-4. — Prix: €128.97. — W. de Gruyter, Berlin, 2007.

In recent years there has been a surge of profound new developments in various aspects of analysis whose connecting thread is the use of Banach space methods. Indeed, many problems seemingly far from the classical geometry of Banach spaces have been solved using Banach space techniques. This volume contains papers by participants of the conference "Banach Spaces and their Applications in Analysis", held in May 2006 at Miami University in Oxford, Ohio, in honor of Nigel Kalton's 60th birthday. In addition to research articles contributed by participants, the volume includes invited expository articles by principal speakers of the conference, who are leaders in their areas. These articles present overviews of new developments in each of the conference's main areas of emphasis, namely nonlinear theory, isomorphic theory of Banach spaces including connections with combinatorics and set theory, algebraic and homological methods in Banach spaces, approximation theory and algorithms in Banach spaces. This volume also contains an expository article about the deep and broad mathematical work of Nigel Kalton, written by his long time collaborator, Gilles Godefroy. Godefroy's article, and in fact the entire volume, illustrates the power and versatility of applications of Banach space methods and underlying connections between seemingly distant areas of analysis.

Luc TARTAR. — **An introduction to Sobolev spaces and interpolation spaces**. — Lecture notes of the Unione Matematica Italiana, vol. 3. — Un vol. broché, 16×23,5, de XXV, 218 p. — ISBN 978-3-540-71482-8. — Prix: €39.95. — Springer, Berlin, 2007.

After publishing an introduction to the Navier-Stokes equation and oceanography (Vol. 1 of this series), Luc Tartar follows with another set of lecture notes based on a graduate course in two parts, as indicated by the title. A draft has been available on the internet for a few years. The author has now revised and polished it into a text accessible to a larger audience.

Théorie des opérateurs

Karl-Heinz FÖRSTER, Peter JONAS, Heinz LANGER, Carsten TRUNK, (Editors). — **Operator theory in inner product spaces**. — Operator theory: advances and applications, vol. 175. — Un vol. relié, 17×24, de VI, 240 p. — ISBN 978-3-7643-8269-8. — Prix: SFr. 219.00. — Birkhäuser, Basel, 2007.

This volume contains contributions written by participants of the 4th Workshop on Operator Theory in Krein Spaces and Applications, which was held at the TU Berlin, Germany, from December 17 to 19, 2004. The workshop covered topics from spectral, perturbation and extension theory of linear operators and relations in inner product spaces, including spectral analysis of differential operators, the theory of generalized Nevanlinna functions and related classes of functions, spectral theory of matrix polynomials, and problems from scattering theory. Contributors: T.Ya. Azizov, J. Behrndt, V. Derkach, A. Fleige, K.-H. Förster, S. Hassi, P. Jonas, M. Kaltenbäck, I. Karabash, A. Kostenko, H. Langer, A. Luger, C. Mehl, B. Nagy, H. Neidhardt, V. Pivovarchik, J. Rehberg, L. Rodman, A. Sandovici, H. de Snoo, L.I. Soukhotcheva, C. Trunk, H. Winkler, H. Woracek.

Jan JANAS, Pavel KURASOV, Ari LAPTEV, Sergei NABOKO, Günter STOLZ, (Editors). — **Operator theory, analysis and mathematical physics**. — Operator theory: advances and applications, vol. 174. — Un vol. relié, 17×24, de VI, 257 p. — ISBN 978-3-7643-8134-9. — Prix: SFr. 219.00. — Birkhäuser, Basel, 2007.

This volume contains lectures delivered by the participants of the International Conference "Operator theory, analysis and mathematical physics" (OTAMP 2004), held at the Mathematical Research and Conference Center in Bedlewo near Poznan, Poland, July 6-11, 2004. The idea behind these lectures was to present interesting ramifications of operator methods in current research of mathematical physics. The main topics are functional models of non-selfadjoint operators, spectral properties of Dirac and Jacobi matrices, Dirichlet-to-Neumann techniques, Lyapunov exponent methods, and inverse spectral problems for quantum graphs.

J. LÓPEZ-GÓMEZ, C. MORA-CORRAL. — **Algebraic multiplicity of eigenvalues of linear operators**. — Operator theory: advances and applications, vol. 177. — Un vol. relié, 17×24, de XXII, 310 p. — ISBN 978-3-7643-8400-5. — Prix: SFr. 169.00. — Birkhäuser, Basel, 2007.

This book brings together all the most important known results of research into the theory of algebraic multiplicities, from well-known classics like the Jordan theorem to recent developments such as the uniqueness theorem and the construction of multiplicity for non-analytic families, which is presented in this monograph for the first time. Part I (the first three chapters) is a classic course on finite-dimensional spectral theory; Part II (the next eight chapters) contains the most general results available about the existence and uniqueness of algebraic multiplicities for real non-analytic operator matrices and families; and Part III (the last chapter) transfers these results from linear to nonlinear analysis. The text is as self-contained as possible. All the results are established in a finite-dimensional setting, if necessary. Furthermore, the structure and style of the book make it easy to access some of the most important and recent developments. Thus the material appeals to a broad audience, ranging from advanced undergraduates (in particular Part I) to graduates, postgraduates and researchers who will enjoy the latest developments in the real non-analytic case (Part II).

Calcul des variations et contrôle optimal

Stanislav V. EMELYANOV, Sergey K. KOROVIN, Nikolai A. BOBYLEV, Alexander V. BULATOV. — **Homotopy of extremal problems: theory and applications.** — De Gruyter series in nonlinear analysis and applications, vol. 11. — Un vol. relié, 18×24,5, de XI, 303 p. — ISBN 978-3-11-018942-1. — Prix: €119,63. — W. de Gruyter, Berlin, 2007.

The basic idea of the homotopy method is as follows: in order to find a solution to a given equation (algebraic, differential, integral, integro-differential, operator, etc.) one constructs a one-parameter family of equations containing both this equation and some equation which has a known solution. This family constitutes a homotopy (or deformation) from the given equation to the new equation, and one tries to deform the solution of the latter with respect to the parameter to obtain a solution of the original equation. This volume presents the theory and some applications of the homotopy method. It begins with a full account of the required prerequisites from topology, classical functional analysis, convex and nonsmooth analysis, differential equations, and a presentation of some typical extremal problems. Subsequently the homotopy method is described and applied to variational problems. The theory of Conley index is developed and its relation to the homotopy method is explained. Finally, a wide range of specific

applications are considered, e.g., to the proof of inequalities, to problems in the calculus of variations, and to nonlinear programming, control theory and bifurcations theory. The book is self-contained and is intended for specialists in the field of nonlinear analysis and its applications as well as for students in these subjects.

Winfried SCHIROTZEK. — **Nonsmooth analysis**. — Universitext. — Un vol. broché, 15,5×23,5, de XII, 373 p. — ISBN 978-3-540-71332-6. — Prix: €39.95. — Springer, Berlin, 2007.

The book treats various concepts of generalized derivatives and subdifferentials in normed spaces, their geometric counterparts (tangent and normal cones) and their application to optimization problems. It starts with the subdifferential of convex analysis, passes to corresponding concepts for locally Lipschitz continuous functions and finally presents subdifferentials for general lower semicontinuous functions. All basic tools are presented where they are needed; this concerns separation theorems, variational and extremal principles as well as relevant parts of multifunction theory. The presentation is rigorous, with detailed proofs. Each chapter ends with bibliographic notes and exercises.

Géométrie différentielle

Andrei MOROIANU. — **Lectures on Kähler geometry**. — London Mathematical Society student texts, vol. 69. — Un vol. broché, 15,5×23, de IX, 171 p. — ISBN 978-0-521-68897-0 (relié: 978-0-521-86891-4). — Prix: £19.99 (relié: £55.00). — Cambridge University Press, Cambridge, 2007.

Kähler geometry is a beautiful and intriguing area of mathematics, of substantial research interest both to mathematicians and physicists. This self-contained graduate text provides a concise and accessible introduction to the topic. The book begins with a review of basic differential geometry, before moving on to a description of complex manifolds and holomorphic vector bundles. Kähler manifolds are discussed from the point of view of Riemannian geometry, and Hodge and Dolbeault theories are outlined, together with a simple proof of the famous Kähler identities. The final part of the text studies several aspects of compact Kähler manifolds: the Calabi conjecture, Weitzenböck techniques, Calabi-Yau manifolds, and divisors. Each section of the book ends with a series of exercises, and students and researchers working in the fields of algebraic and differential geometry and theoretical physics will find that the book provides them with a sound understanding of this theory.

Topologie des variétés, analyse globale et analyse des variétés

Alejandro ADEM, Johann LEIDA, Yongbin RUAN. — **Orbifolds and stringy topology**. — Cambridge tracts in mathematics, vol. 171. — Un vol. relié, 16×23,5, de XI, 149 p. — ISBN 978-0-521-87004-7. — Prix: £35.00. — Cambridge University Press, Cambridge, 2007.

An introduction to the theory of orbifolds from a modern perspective, combining techniques from geometry, algebraic topology and algebraic geometry, and suitable for researchers and graduate students. One of the main motivations, and a major source of examples, is string theory, where orbifolds play an important role. The subject is first developed following the classical description analogous to manifold theory, after which the book branches out to include the useful

description of orbifolds provided by groupoids, as well as many examples in the context of algebraic geometry. Classical invariants such as de Rham cohomology and bundle theory are developed for orbifolds, and a careful study of orbifold morphisms is provided. The topic of orbifold K-theory and its twistings is covered, with several illustrative examples. The heart of the book, however, is a detailed description of the Chen-Ruan cohomology, which introduces a new product for orbifolds and has had significant impact over the past few years. The final chapter includes explicit computations for a number of interesting examples.

Probabilités et processus stochastiques

Robert J. ADLER, Jonathan E. TAYLOR. — **Random fields and geometry.** — Springer monographs in mathematics. — Un vol. relié, 16×24,5, de XVII, 448 p. — ISBN 978-0-387-48112-8. — Prix : €54.95. — Springer, New York, 2007.

This monograph is devoted to a completely new approach to geometric problems arising in the study of random fields. The groundbreaking material in Part III, for which the background is carefully prepared in Parts I and II, is of both theoretical and practical importance, and striking in the way in which problems arising in geometry and probability are beautifully intertwined. The three parts to the monograph are quite distinct. Part I presents a user-friendly yet comprehensive background to the general theory of Gaussian random fields, treating classical topics such as continuity and boundedness, entropy and majorizing measures, Borell and Slepian inequalities. Part II gives a quick review of geometry, both integral and Riemannian, to provide the reader with the material needed for Part III, and to give some new results and new proofs of known results along the way. Topics such as Crofton formulae, curvature measures for stratified manifolds, critical point theory, and tube formulae are covered. In fact, this is the only concise, self-contained treatment of all the above topics, which are necessary for the study of random fields. The new approach in Part III is devoted to the geometry of excursion sets of random fields and the related Euler characteristic approach to extremal probabilities. This text will serve as a basic reference for all those interested in the companion volume of the applications of the theory. These applications, to appear in a forthcoming volume, will cover areas as widespread as brain imaging, physical oceanography, and astrophysics.

S. PESZAT, J. ZABCZYK. — **Stochastic partial differential equations with Lévy noise: an evolution equation approach.** — Encyclopedia of mathematics and its applications, vol. 113. — Un vol. relié, 16×24, de XII, 419 p. — ISBN 978-0-521-87989-7. — Prix : £65.00. — Cambridge University Press, Cambridge, 2007.

Recent years have seen an explosion of interest in stochastic partial differential equations where the driving noise is discontinuous. In this comprehensive monograph, two leading experts apply the evolution equation approach to the analysis of the solutions. Most of the results appear here for the first time in book form, and the volume is sure to stimulate further research in this important field. The authors start with a detailed analysis of Lévy processes in infinite dimensions and their reproducing kernel Hilbert spaces; cylindrical Lévy processes are constructed in terms of Poisson random measures; stochastic integrals are introduced. Stochastic parabolic and hyperbolic equations on domains of arbitrary dimensions are studied, and applications to statistical and fluid mechanics and to finance are also investigated. Ideal for researchers and graduate students in stochastic processes and partial differential equations, this self-contained text will also interest those working on stochastic modelling in finance, statistical physics, and environmental science.

Statistique

Elart von COLLANI, Karl BAUR. — **Was zum Teufel ist Qualität?** — Sigma series in stochastics, vol. 2. — Un vol. relié, 17,5×25, de x, 205 p. — ISBN 3-88538-302-4. — Prix: €32.00. — Heldermann Verlag, Lemgo, 2007.

Was ist Qualität? In diesem Buch wird nicht nur diese Frage beantwortet, sondern auch die weiterführende, woran es gelegen haben kann, dass sie bisher unbeantwortet blieb, obwohl Philosophen sich seit Jahrtausenden damit beschäftigt haben. Der in diesem Buch gespannte Bogen reicht von Aristoteles, über Galilei, Jakob Bernoulli, zu Einstein und der Quantenmechanik. Er schliesst das US-Militär und andere wichtige Expertgruppen zum Thema Qualität ein und beleuchtet das bizarre Geschäft, das um die Ware Qualität und ihren Verkauf entstanden ist.

Analyse numérique

Roland GLOWINSKI, Jean-Paul ZOLÉSIO, (Editors). — **Free and moving boundaries: analysis, simulation and control.** — Lecture notes in pure and applied mathematics, vol. 252. — Un vol. broché, 18×25,5, de 454 p. — ISBN 978-1-58488-606-8. — Prix: US$169.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2007.

Addressing algebraic problems found in biomathematics and energy, *Free and Moving Boundaries: Analysis, Simulation and Control* discusses moving boundary and boundary control in systems described by partial differential equations. With contributions from international experts, the book emphasizes numerical and theoretical control of moving boundaries in fluid structure couple systems, arteries, shape stabilization level methods, family of moving geometries, and boundary control. Using numerical analysis, the contributors examine the problems of optimal control theory applied to partial differential equations that arise from continuum mechanics. The book presents several applications to electromagnetic devices, flow, control, computing, images analysis, topological changes, and free boundaries. It specifically focuses on the topics of boundary variation and control, dynamical control of geometry, optimization, free boundary problems, stabilization of structures, controlling fluid-structure devices, electromagnetism 3D, and inverse problems that occur in areas such as biomathematics. *Free and Moving Boundaries: Analysis, Simulation and Control* explains why the boundary control of physical systems can be viewed as a moving boundary control, empowering the future research of select algebraic areas. — *Features*: Emphasizes numerical and theoretical control of moving boundaries; explores the problems of optimal control theory applied to partial differential equations arising from continuum mechanics; addresses boundary variation and control, dynamical control of geometry, optimization, and inverse problems; presents numerical simulation of suspensions, liquids, and shape gradients; discusses boundary conditions, including Neumann, Dirichlet, and Robin.

William H. PRESS, Saul A. TEUKOLSKY, William T. VETTERLING, Brian P. FLANNERY. — **Numerical recipes: the art of scientific computing.** — Third edition. — Un vol. relié, 19×26,5, de XXI, 1235 p. — ISBN 978-0-521-88068-8. — Prix: £45.00. — Cambridge University Press, Cambridge, 2007.

Co-authored by four leading scientists from academia and industry, *Numerical Recipes: third edition* starts with basic mathematics and computer science and proceeds to complete,

working routines. Widely recognized as the most comprehensive, accessible, and practical basis for scientific computing, this new edition incorporates more than 400 numerical recipe routines, many of them new or upgraded. The executable C++ code, now printed in color for easy reading, adopts an object-oriented style particularly suited to scientific applications. The whole book is presented in the informal, easy-to-read style that made earlier editions so popular. — *New key features*: 2 new chapters, 25 new sections; thorough upgrades throughout the text; over 100 completely new routines and upgrades of many more; new classification and inference chapter, including Gaussian mixture models, HMMs, hierarchical clustering, and support vector machines; new computational geometry chapter covering KD trees, quad- and octrees, Delaunay triangulation, and algorithms for lines, polygons, triangles, and spheres; new sections including interior point methods for linear programming, Monte Carlo Markov chains, spectral and pseudospectral methods for PDEs, and many new statistical distributions; an expanded treatment of ODEs with completely new routines; etc.

Informatique

Igor KONONENKO, Matjaž KUKAR. — **Machine learning and data mining: introduction to principles and algorithms.** — Un vol. broché, 16×23,5, de XIX, 454 p. — ISBN 978-1-904275-21-3. — Prix: £50.00. — Horwood Publishing, Chichester, 2007.

Data mining is often referred to by real-time users and software solutions providers as knowledge discovery in databases (KDD). Good data mining practice for business intelligence (the art of turning raw software into meaningful information) is demonstrated by the many new techniques and developments in the conversion of fresh scientific discovery into widely accessible software solutions. *Machine Learning and Data Mining* has been written as an introduction to the main issues associated with the basics of machine learning (ML) and the algorithms used in data mining. It is suitable for advanced undergraduate and postgraduate students of computer science, researchers who want to adapt algorithms for particular data mining tasks, and advanced users of machine learning and data mining tools.

Mécanique des fluides, acoustique

Lewis Fry RICHARDSON. — **Weather prediction by numerical process.** — Second edition. — Cambridge Mathematical Library. — Un vol. broché, 17,5×25, de XIII, 236 p. — ISBN 978-0-521-68044-8. — Prix: £29.99. — Cambridge University Press, Cambridge, 2007.

The idea of forecasting the weather by calculation was first dreamt of by Lewis Fry Richardson. He set out in this book a detailed algorithm for systematic numerical weather prediction. The method of computing atmospheric changes, which is mapped out in great detail here, is essentially the one used today. He was greatly ahead of his time, because, before his ideas could bear fruits, advances in four critical areas were needed: better understanding of the dynamics of the atmosphere; stable computational algorithms to integrate the equations; regular observations of the free atmosphere; and powerful automatic computer equipment. Over the ensuing years, progress in numerical weather prediction has been dramatic. Weather prediction and climate modelling have now reached a high level of sophistication, and are witness to the influence of Richardson's ideas. This new edition contains a new foreword by Peter Lynch that sets the original book in context.

Mécanique quantique

Bertfried FAUSER, Jürgen TOLKSDORF, Eberhard ZEIDLER, (Editors). — **Quantum gravity: mathematical models and experimental bounds.** — Un vol. relié, 17,5 × 24, de XVI, 336 p. — ISBN 978-3-7643-7977-3. — Prix : SFr. 149.00.— Birkhäuser, Basel, 2007.

The construction of a quantum theory of gravity is the most fundamental challenge confronting contemporary theoretical physics. The different physical ideas which evolved while developing a theory of quantum gravity require highly advanced mathematical methods. This book presents different mathematical approaches to formulate a theory of quantum gravity. It represents a carefully selected cross-section of lively discussions about the issue of quantum gravity which took place at the second workshop "Mathematical and physical aspects of quantum gravity" in Blaubeuren, Germany. This collection covers in a unique way aspects of various competing approaches. A unique feature of the book is the presentation of different approaches to quantum gravity making comparison feasible. This feature is supported by an extensive index. The book is mainly addressed to mathematicians and physicists who are interested in questions related to mathematical physics. It allows the reader to obtain a broad and up-to-date overview on a fascinating active research area.