Zeitschrift: L'Enseignement Mathématique
Herausgeber: Commission Internationale de l'Enseignement Mathématique
Band: 54 (2008)
Heft: 1-2

Rubrik: Bulletin bibliographique
Autor: [s.n.]

Extrait de *L'Enseignement Mathématique* (2) 54 (2008), fasc. 1-2

BULLETIN BIBLIOGRAPHIQUE

Généralités

Herbert AMANN, Joachim ESCHER. — **Analysis II.** — Translated from the German by Silvio Levy and Matthew Cargo. — Un vol. broché, 17×24, de XII, 400 p. — ISBN 978-3-7643-7472-3. — Prix : SFr. 125.00. — Birkhäuser, Basel, 2008.

The second volume of this introduction to analysis deals with the integration theory of functions of one variable, the multidimensional differential calculus and the theory of curves and line integrals. The modern and clear development that started in Volume I (978-3-7643-7153-1) continues. In this way a sustainable basis will be created which allows one to deal with interesting applications that sometimes go considerably beyond the material represented in traditional textbooks. This applies, for instance, to the exploration of Nemytskii operators which enable a transparent introduction into the calculus of variations and the derivation of the Euler-Lagrange equations. Another example is the presentation of the local theory of submanifolds of $\mathbf{R}^n$.

Sarah-Marie BELCASTRO, Carolyn YACKEL, (Editors). — **Making mathematics with needlework: ten papers and ten projects.** — Un vol. relié, 21×23,5, de XII, 184 p. — ISBN 978-1-56881-331-8. — Prix : US$30.00. — A.K. Peters, Wellesley, Massachusetts, 2008.

Mathematicians and crafters alike are fascinated by the relationship between their trades. Beautifully illustrated, and with complete patterns and the mathematics behind each project, this book successfully connects the worlds of mathematics and the fiber arts. Each chapter covers a different mathematical paper and corresponding needlework project and includes mathematical explanations, needlework instructions, educational material, and specific projects to demonstrate the principles discussed. *Making Mathematics with Needlework* will inspire mathematicians, mathematics educators, and crafters. All readers will be able to understand the overview sections, as they include introductions to the various fiber arts as well as lay summaries of the mathematical content. While the mathematics sections are written for mathematicians, the authors have made a special effort to make their work accessible to lay readers by providing definitions of mathematical terms and many diagrams. The project sections are written for crafters, so that our non-mathematician readers can have a tangible experience with mathematical concepts. This colourful collection presents examples of current research and

issues still to be investigated, using topology, graph theory, number theory and algebra, very basic combinatorics, observations of symmetry, and brute force.

Elie BELORIZKY. — **Outils mathématiques à l'usage des scientifiques et ingénieurs.** — Grenoble sciences. — Un vol. broché, 17×25, de 383 p. — ISBN 978-2-7598-0007-0. — Prix: €39.00. — EDP Sciences, Les Ulis, 2007.

Cet ouvrage répond au besoin des physiciens, scientifiques, ingénieurs… qui doivent résoudre des problèmes mathématiques dans l'analyse et l'interprétation de phénomènes physiques et de leurs applications techniques. Une première partie, assez élémentaire, traite les équations différentielles, les fonctions analytiques et l'intégration dans le plan complexe, le calcul opérationnel (transformation de Laplace), l'analyse de Fourier et la résolution de quelques équations aux dérivées partielles. Une deuxième partie, d'un niveau plus élevé, aborde les tenseurs, les polynômes orthogonaux nécessaires à la mécanique quantique, les fonctions de Bessel et les relations de Kramers-Kronig relatives à la réponse d'un système à une excitation. Les techniques développées sont suffisantes pour traiter la majorité des phénomènes physiques fondamentaux. La qualité pédagogique permet à un non-mathématicien de s'approprier les outils, sans développement excessif, tout en conservant un minimum de rigueur. Une bibliographie générale et un index facilitent l'usage de cet ouvrage de base.

Valentin BOJU, Louis FUNAR. — **The math problems notebook.** — Un vol. broché, 15,5×23,5, de XII, 232 p. — ISBN 978-0-8176-4546-5. — Prix: SFr. 59.90. — Birkhäuser, Boston, 2007.

The Math Problems Notebook is a collection of nontrivial, unconventional problems requiring deep insight and imagination reminiscent of those discussed at Sunday Math Circles. These circles have become a place for disseminating beautiful mathematics at an elementary level for college students who have a common passion for mathematics. The problems cover many topics, including number theory, algebra, combinatorics, geometry and analysis, of varying levels of difficulty. The presentation of each topic begins with simple exercises and follows with more difficult problems, challenging enough even for the experienced problem solver. The easier problems focus on basic methods and tools, while the more advanced problems develop problem-solving techniques, intuition and promote further research. Undergraduates and teachers of advanced mathematics, as well as the casual mathematician will mutually enjoy *The Math Problems Notebook*.

Jean-Jacques COLIN, Jean-Marie MORVAN. — **Fonctions usuelles: exercices corrigés avec rappels de cours: L1, L2, L3, classes préparatoires.** — Avec la participation de Rémi MORVAN. — Bien débuter en mathématiques. — Un vol. broché, 14,5×20,5, de 153 p. — ISBN 978-2-85428-812-4. — Prix: €17.00. — Cépaduès-Editions, Toulouse, 2007.

Cet ouvrage traite des fonctions usuelles (logarithmes, exponentielles, puissance, fonctions circulaires et circulaires réciproques, fonctions hyperboliques et hyperboliques réciproques), qui constituent la base fondamentale de l'analyse réelle. Il s'adresse aux étudiants de premières années d'université, (L1, L2, L3), des classes préparatoires aux Grandes Écoles, ainsi qu'aux étudiants qui préparent le C.A.P.E.S. de mathématiques. Il propose à la fois des rappels de cours et des exercices corrigés de façon particulièrement détaillée, classés par ordre de difficulté croissante. Le lecteur pourra ainsi progresser à son rythme et de façon autonome dans cette discipline. Chaque chapitre est agrémenté de pages historiques, qui replacent les résultats énoncés dans leur contexte. Les exercices proposés sont typiques des questions posées aux examens et aux concours. Une fois ces notions assimilées, le lecteur pourra sans difficultés s'engager dans des études plus avancées.

G.H. HARDY. — **A course of pure mathematics.** — Tenth edition with a foreword by T.W. Körner. — Un vol. broché, 15,5 × 23, de XIX, 509 p. — ISBN 978-0-521-72055-7. — Prix : £24.99. — Cambridge University Press, Cambridge, 2008.

There can be few textbooks of mathematics as well known as Hardy's *Pure Mathematics*. Since its publication in 1908, it has been a classic work to which successive generations of budding mathematicians have turned at the beginning of their undergraduate courses. In its pages, Hardy combines the enthusiasm of the missionary with the rigour of the purist in his exposition of the fundamental ideas of the differential and integral calculus, of the properties of infinite series and of other topics involving the notion of limit. Celebrating 100 years in print with Cambridge, this Centenary edition includes a foreword by T.W. Körner, describing the huge influence the book has had on the teaching and development of mathematics worldwide, and indeed on those mathematics books that followed. Hardy's presentation of mathematical analysis is as valid today as when it was first written, and students will find that his economical and energetic style of presentation is one that modern authors rarely come close to.

Mikhail KAPRANOV, Sergiy KOLYADA, Yuri I. MANIN, Pieter MOREE, Leonid POTYAGAILO, (Editors). — **Geometry and dynamics of groups and spaces : in memory of Alexander Reznikov.** — Progress in mathematics, vol. 265. — Un vol. relié, 16,5 × 24, de XXIX, 742 p. — ISBN 978-3-7643-8607-8. — Prix : SFr. 139.00. — Birkhäuser, Basel, 2008.

This book contains 19 articles by prominent mathematicians, dedicated to the memory of Alexander Reznikov (1960-2003), a brilliant, highly original mathematician with broad mathematical interests. In addition it contains an influential, so far unpublished, manuscript of Reznikov of book length. The research articles broadly reflect the range of Reznikov's own interests in geometry, group and number theory, functional analysis, dynamical systems and topology. In addition there are a number of survey articles as well as contributions centering on Reznikov as a person. The articles collected in this volume should be of interest to professional mathematicians in such areas of mathematics as algebra, dynamical systems, geometry, group theory, functional analysis, number theory, probability theory and topology. The broad spectrum of topics covered also presents an exciting opportunity for graduate students and young researchers working in any of these areas who are willing to put their research in a wider mathematical perspective.

Benoît RITTAUD, Hélène MAUREL. — **Les mystères du hasard.** — Les minipommes, vol. 23. — Un vol. broché, 12,5 × 18, de 62 p. — ISBN 9-782-7465-0361-8. — Prix : €8.00. — Le Pommier, Paris, 2008.

Est-ce que tout arrive par hasard ? Comment étudie-t-on le hasard ? Est-ce qu'on peut le commander ? Finalement, est-ce qu'il existe vraiment ? Qui est donc cet étrange Al-Zahr que Michel, Hamid et Claire rencontrent en partant en promenade à rollers ? Pourquoi ne propose-t-il que des dés et autres jeux de hasard dans sa boutique ? Hasard, vous avez dit hasard ?

Benoît RITTAUD, (Dir.), Elise JANVRESSE, Emmanuel LESIGNE, Jean-Christophe NOVELLI, Thierry de la RUE. — **Quand les maths se font discrètes.** — Le collège de la cité. — Un vol. broché, 10 × 16, de 175 p. — ISBN 978-2-7465-0370-0. — Prix : €8.60. — Le Pommier/Cité des Sciences et de l'Industrie, Paris, 2008.

Les mathématiques discrètes sont la partie des mathématiques qui s'intéresse à des objets « énumérables » comme une succession de nombres entiers, un réseau routier fait de carrefours reliés par des routes, le codage et l'interprétation de données mises sous la forme d'une suite de 0 et de 1, etc. Encore balbutiantes au début du XX^{e} siècle, les mathématiques discrètes ont, depuis, pris leur essor, notamment sous l'impulsion de l'informatique. Elles constituent un

élément essentiel du paysage mathématique contemporain et concernent, entre autres, la combinatoire, les systèmes dynamiques, l'algorithmique, la complexité, la théorie des nombres ou encore les probabilités. Dans cet ouvrage, quatre situations de mathématiques discrètes sont considérées: Le comptage des arbres binaires, un sujet de combinatoire, outil essentiel de l'informatique (Jean-Christophe Novelli). — Les suites de Fibonacci aléatoires, au carrefour des systèmes dynamiques, des probabilités et de la théorie des nombres (Benoît Rittaud). — Le traitement numérique de l'image, aux applications désormais quotidiennes (Elise Janvresse et Thierry de la Rue). — La suite de Morse, suite de 0 et de 1 qui a été considérée aussi bien par des théoriciens de la combinatoire des mots que par des champions d'échecs (Emmanuel Lesigne).

Felice RONGA. — **Analyse réelle post-élémentaire.** — Un vol. relié, 16×24, de XII, 292 p. — Prix: €16.16. — www.lulu.com, 2007.

Dans ce livre, on présente des méthodes et outils classiques de l'analyse réelle, ainsi que des applications, qui sont des développements naturels des sujets exposés, mais que l'on ne trouve généralement que dans des ouvrages plus spécialisés et moins élémentaires. Ainsi au chapitre I, on expose la méthode IFS pour la construction de fractals, au chapitre II les singularités de contours apparents de surfaces et des enveloppes de familles de courbes planes, au chapitre III la méthode de Liapounov pour l'étude des singularités de champs de vecteurs, au chapitre IV le théorème d'existence d'équilibre de Nash. Ce livre est basé sur les notes de cours de l'auteur en deuxième année, à la Section de mathématiques de l'Université de Genève.

Wolfgang SCHWARZ. — **40 puzzles and problems in probability and mathematical statistics.** — Problem books in mathematics. — Un vol. relié, 16,5×24, de XII, 124 p. — ISBN 978-0-387-73511-5. — Prix: €39.95. — Springer, New York, 2008.

40 Puzzles and Problems in Probability and Mathematical Statistics is intended to teach the reader to think probabilistically by solving challenging, non-standard probability problems. The motivation for this clearly written collection lies in the belief that challenging problems help to develop, and to sharpen, our probabilistic intuition much better than plain-style deductions from abstract concepts. The selected problems fall into two broad categories. Problems related to probability theory come first, followed by problems related to the application of probability to the field of mathematical statistics. All problems seek to convey a non-standard aspect or an approach which is not immediately obvious. The word puzzles in the title refers to questions in which some qualitative, non-technical insight is most important. Ideally, puzzles can teach a productive new way of framing or representing a given situation. Although the border between the two is not always clearly defined, problems tend to require a more systematic application of formal tools, and to stress more technical aspects. Thus, a major aim of the present collection is to bridge the gap between introductory texts and rigorous state-of-the-art books. Anyone with a basic knowledge of probability, calculus and statistics will benefit from this book; however, many of the problems collected require little more than elementary probability and straight logical reasoning. To assist anyone using this book for self-study, the author has included very detailed step-for-step solutions of all problems and also short hints which point the reader in the appropriate direction.

Nicholas YOUNG, Yemon CHOI, (Editors). — **Surveys in contemporary mathematics.** — London Mathematical Society lecture note series, vol. 347. — Un vol. broché, 15×23, de VII, 361 p. — ISBN 978-0-521-70564-6. — Prix: £40.00. — Cambridge University Press, Cambridge, 2008.

Young scientists in Russia are continuing the outstanding tradition of Russian mathematics in their home country, in spite of the post-Soviet diaspora. This volume, the second of two,

showcases the recent achievements of young Russian mathematicians, and the strong research groups they are associated with. The first volume focused on geometry and number theory; this one concentrates on combinatorial and algebraic geometry and topology. The articles are mainly surveys of the recent work of the research groups and contain a substantial number of new results. Topics covered include algebraic geometry over Lie groups, cohomology of face rings, the Borsuk partition problem, embedding and knotting of manifolds in Euclidean spaces, and Maxwellian and Boltzmann distributions. The authors are A.E. Guterman, I.V. Kazachkov, A.V. Malyutin, D.V. Osipov, T.E. Panov, A.M. Raigorodskii, A.B. Skopenkov and V.V. Ten.

Georges ZAFINDRATAFA, Jean-Marie MORVAN. — **Espaces vectoriels, matrices: exercices corrigés avec rappels de cours: L1, L2, L3, classes préparatoires.** — Avec la participation de Rémi MORVAN. — Bien débuter en mathématiques. — Un vol. broché, 14,5 × 20,5, de 155 p. — ISBN 978-2-85428-799-8. — Prix: €17.00. — Cépaduès-Editions, Toulouse, 2007.

Cet ouvrage est un recueil d'exercices élémentaires d'algèbre linéaire, précédés de rappels de cours. Il peut être lu par tout étudiant qui vient juste d'obtenir son baccalauréat! Il recouvre une partie du programme d'algèbre de première année de licence scientifique et de mathématiques supérieures. Il s'adresse donc aux étudiants de premières années d'Université et des classes préparatoires aux Grandes Écoles. Chaque exercice est soigneusement corrigé et commenté, et se trouve précédé des rappels de cours indispensables à sa résolution. L'algèbre linéaire est ici présentée de façon particulièrement simple et abordable. Contrairement à la plupart des autres ouvrages, l'axiomatique n'y apparaît qu'au troisième chapitre, les deux premiers permettant au lecteur de se familiariser avec les tableaux de nombres et les systèmes linéaires simples. Il va sans dire que les thèmes abordés ici sont fondamentaux, (formule du rang, théorème de la base incomplète, …). Ils devront être parfaitement assimilés par tous ceux qui désirent acquérir un bagage mathématique élémentaire. Le texte est agrémenté de pages historiques, qui replacent les résultats énoncés dans leur contexte.

Histoire

Israel KLEINER. — **A history of abstract algebra.** — Un vol. broché, 15,5 × 23,5, de XIII, 168 p. — ISBN 978-0-8176-4684-4. — Prix: SFr. 65.00. — Birkhäuser, Boston, 2007.

Prior to the nineteenth century, algebra meant the study of the solution of polynomial equations. By the twentieth century algebra came to encompass the study of abstract, axiomatic systems such as groups, rings, and fields. This presentation provides an account of the intellectual lineage behind many of the basic concepts, results, and theories of abstract algebra. The development of abstract algebra was propelled by the need for new tools to address certain classical problems that appeared unsolvable by classical means. A major theme of the approach in this book is to show how abstract algebra has arisen in attempts to solve some of these classical problems, providing context from which the reader may gain a deeper appreciation of the mathematics involved. — *Key features*: Begins with an overview of classical algebra. — Contains separate chapters on aspects of the development of groups, rings, and fields. — Examines the evolution of linear algebra as it relates to other elements of abstract algebra. — Highlights the lives and works of six notables: Cayley, Dedekind, Galois, Gauss, Hamilton, and especially the pioneering work of Emmy Noether. — Offers suggestions to instructors on ways of integrating the history of abstract algebra into their teaching. — Each chapter concludes with extensive references to the relevant literature. Mathematics instructors, algebraists, and historians of science will find the work a valuable reference. The book may also serve as a supplemental text for courses in abstract algebra or the history of mathematics.

Logique et fondements

Alessandro ANDRETTA, Keith KEARNES, Domenico ZAMBELLA, (Editors). — **Logic colloquium 2004: proceedings of the Annual European Summer Meeting of the Association for Symbolic Logic, held in Torino, Italy, July 25-31, 2004.** — Lecture notes in logic, vol. 29. — Un vol. relié, 16×23,5, de XII, 220 p. — ISBN 978-0-521-88424-2. — Prix: £40.00. — Cambridge University Press, Cambridge, 2008.

The Annual European Meeting of the Association for Symbolic Logic, generally known as the Logic Colloquium, is the most prestigious annual meeting in the field. Many of the papers presented there are invited surveys of recent developments, and the rest of the papers are chosen to complement the invited talks. This volume includes surveys, tutorials, and selected research papers from the 2004 meeting. Highlights include a tutorial survey of the recent highpoints of universal algebra, written by a leading expert; explorations of foundational questions; and a quartet of model theory papers giving an excellent reflection of current work in model theory, from the most abstract aspect "abstract elementary classes" to issues around p-adic integration.

Deirdre HASKELL, Ehud HRUSHOVSKI, Dugald MACPHERSON. — **Stable domination and independence in algebraically closed valued fields.** — Lecture notes in logic, vol. 30. — Un vol. relié, 16×23,5, de XI, 182 p. — ISBN 978-0-521-88981-0. — Prix: £35.00. — Cambridge University Press, Cambridge, 2008.

This book addresses a gap in the model-theoretic understanding of valued fields that has, until now, limited the interactions of model theory with geometry. It contains significant developments in both pure and applied model theory. Part I of the book is a study of stably dominated types. These form a subset of the type space of a theory that behaves in many ways like the space of types in a stable theory. This part begins with an introduction to the key ideas of stability theory for stably dominated types. Part II continues with an outline of some classical results in the model theory of valued fields and explores the application of stable domination to algebraically closed valued fields. The research presented here is made accessible to the general model theorist by the inclusion of the introductory sections of each part.

Stevo TODORCEVIC. — **Walks on ordinals and their characteristics.** — Progress in mathematics, vol. 263. — Un vol. relié, 16×24, de VI, 324 p. — ISBN 978-3-7643-8528-6. — Prix: SFr. 105.00. — Birkhäuser, Basel, 2007.

The analysis of the characteristics of walks on ordinals is a powerful new technique for building mathematical structures, developed by the author over the last twenty years. This is the first book-length exposition of this method. Particular emphasis is placed on applications which are presented in a unified and comprehensive manner and which stretch across several areas of mathematics such as set theory, combinatorics, general topology, functional analysis, and general algebra. The intended audience for this book is graduate students and researchers working in these areas interested in mastering and applying these methods.

Jind ich ZAPLETAL. — **Forcing idealized.** — Cambridge tracts in mathematics, vol. 174. — Un vol. relié, 16×23,5, de VI, 314 p. — ISBN 978-0-521-87426-7. — Prix: £50.00. — Cambridge University Press, Cambridge, 2008.

Descriptive set theory and definable proper forcing are two areas of set theory that developed quite independently of each other. This monograph unites them and explores the connections between them. Forcing is presented in terms of quotient algebras of various natural sigma-ideals on Polish spaces, and forcing properties in terms of Fubini-style properties or in terms of

determined infinite games on Boolean algebras. Many examples of forcing notions appear, some newly isolated from measure theory, dynamical systems, and other fields. The descriptive set theoretic analysis of operations on forcings opens the door to applications of the theory: absoluteness theorems for certain classical forcing extensions, duality theorems, and preservation theorems for the countable support iteration. Containing original research, this text highlights the connections that forcing makes with other areas of mathematics, and is essential reading for academic researchers and graduate students in set theory, abstract analysis, and measure theory.

Analyse combinatoire

Francine BLANCHET-SADRI. — **Algorithmic combinatorics on partial words.** — Discrete mathematics and its applications. — Un vol. relié, 16×24, de 385 p. — ISBN 978-1-4200-6092-8. — Prix: US$89.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2008.

Delving into this emerging research area, *Algorithmic Combinatorics on Partial Words* presents a mathematical treatment of combinatorics on partial words designed around algorithms and explores up-and-coming techniques for solving partial word problems as well as the future direction of research. This five-part book begins with a section on basics that covers terminology, the compatibility of partial words, and combinatorial properties of words. The book then focuses on three important concepts of periodicity on partial words: period, weak period, and local period. The next part describes a linear time algorithm to test primitivity on partial words and extends the results on unbordered words to unbordered partial words, while the following section introduces some important properties of pcodes, details a variety of ways of defining and analyzing pcodes, and shows that the pcode property is decidable using two different techniques. In the final part, the author solves various equations on partial words, presents binary and ternary correlations, and covers unavoidable sets of partial words. Setting the tone for future research in this field, this book lucidly develops the central ideas and results of combinatorics on partial words. — *Features:* Presents algorithms in English followed by pseudo code to facilitate implementation of the algorithms. — Provides abundant worked examples and diagrams to illustrate concepts. — Offers links to many web interfaces that have been established for automated use of the programs related to the book. — Contains numerous exercises, including programming exercises, at the end of each chapter as well as selected solutions at the back of the book.

Théorie des nombres

A. BAKER, G. WÜSTHOLZ. — **Logarithmic forms and Diophantine geometry.** — New mathematical monographs, vol. 9. — Un vol. relié, 16×23,5, de x, 198 p. — ISBN 978-0-521-88268-2. — Prix: £40.00. — Cambridge University Press, Cambridge, 2007.

There is now much interplay between studies on logarithmic forms and deep aspects of arithmetic algebraic geometry. New light has been shed, for instance, on the famous conjectures of Tate and Shafarevich relating to Abelian varieties and the associated celebrated discoveries of Faltings establishing the Mordell conjecture. This book gives an account of the theory of linear forms in the logarithms of algebraic numbers with special emphasis on the important developments of the past twenty-five years. The first part concentrates on basic material in transcendental number theory but with a modern perspective including discussion of the Mahler-Manin conjecture, of the Riemann hypothesis over finite fields, of significant new studies on the

effective solution of Diophantine problems and of the *abc*-conjecture. The remainder assumes some background in Lie algebras and group varieties and it covers, in certain instances for the first time in book form, more advanced topics including the work of Masser and Wüstholz on zero estimates on group varieties (derived by a new, more algebraic approach that involves Hilbert functions and Poincaré series), the analytic subgroup theorem and its principal applications; these areas reflect substantial original research. The final chapter summarises other aspects of Diophantine geometry including hypergeometric theory and the André-Oort conjecture. A comprehensive bibliography rounds off this definitive survey of effective methods in Diophantine geometry.

Enrico Bombieri, Walter Gubler. — **Heights in Diophantine geometry.** — Reprinted with corrections. — New mathematical monographs, vol. 4. — Un vol. broché, 15,5×23, de xvi, 652 p. — ISBN 978-0-521-71229-3 (relié: 978-0-521-84615-8). — Prix: £35.00 (relié: £75.00). — Cambridge University Press, Cambridge, 2007.

Diophantine geometry has been studied by number theorists for thousands of years, since the time of Pythagoras, and has continued to be a rich area of ideas such as Fermat's Last Theorem, and most recently the ABC conjecture. This monograph is a bridge between the classical theory and the modern approach via arithmetic geometry. The authors aim to provide a clear path through the subject for graduate students and researchers. They have re-examined many results and much of the literature, and give a thorough account of several topics at a level not seen before in book form. The treatment is largely self-contained (there are appendices on algebraic geometry, ramification and the geometry of numbers), with proofs given in full detail. Many results appear here for the first time. The first half of the book is devoted to the general theory of heights and its applications including a complete, detailed proof of the celebrated subspace theorem of W.M. Schmidt. The second part deals with Abelian varieties, the Mordell-Weil theorem and Faltings' proof of the Mordell conjecture, ending with a self-contained exposition of Nevanlinna theory and the related famous conjectures of Vojta. The book concludes with a comprehensive bibliography. It is destined to be a definitive reference on modern Diophantine geometry, bringing a new standard of rigor and elegance to the field.

Daniel Duverney. — **Théorie des nombres: cours et exercices corrigés.** — Deuxième édition. — Sciences sup. — Un vol. broché, 17×24, de vi, 262 p. — ISBN 978-2-10-051234-8. — Prix: €29.00. — Dunod, Paris, 2007.

Cet ouvrage propose une introduction à la théorie des nombres sous ses différents aspects: problèmes d'irrationalité et de transcendance, fractions continues, équations diophantiennes, formes quadratiques, fonctions arithmétiques et théorie algébrique des nombres. Les différents chapitres, très largement indépendants, se terminent par des exercices intégralement corrigés qui permettent au lecteur d'assimiler les notions étudiées. Cette deuxième édition, entièrement revue et corrigée, comporte des éléments supplémentaires sur la distribution des nombres premiers, les démonstrations des théorèmes de Gelfond-Schneider et de Thue, ainsi que de nouveaux exercices corrigés. Destiné principalement aux étudiants en L3 ou en master de mathématiques, il s'adresse également aux candidats au CAPES et à l'agrégation, ainsi qu'à toute personne qui apprécie la théorie des nombres pour la simplicité de ses énoncés et la variété de ses méthodes.

Martin Erickson, Anthony Vazzana. — **Introduction to number theory.** — Discrete mathematics and its applications. — Un vol. relié, 16,5×24,5, de 521 p. — ISBN 978-1-58488-937-3. — Prix: US$89.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2008.

One of the oldest branches of mathematics, number theory is a vast field devoted to studying the properties of whole numbers. *Introduction to Number Theory* uses worked examples, numerous exercises, and two popular software packages to describe a diverse array of number

theory topics. This reader-friendly text covers a wide range of subjects, from the ancient Euclidean algorithm for finding the greatest common divisor of two integers to recent developments that include cryptography, the theory of elliptic curves, and the negative solution of Hilbert's tenth problem. The authors illustrate the connections between number theory and other branches of mathematics, including algebra, analysis, and combinatorics. They also describe applications of number theory to real-world problems, such as congruences in the ISBN systems, modular arithmetic and Euler's theorem in RSA encryption, and quadratic residues in the construction of tournaments. The book interweaves the theoretical development of the material with *Mathematica*®, and Maple™ calculations while giving brief tutorials on the software in the appendices. Highlighting both fundamental and advanced topics, this introduction provides all of the tools to achieve a solid foundation in number theory.

Wee Teck GAN, Stephen S. KUDLA, Yuri TSCHINKEL, (Editors). — **Eisenstein series and applications.** — Progress in mathematics, vol. 258. — Un vol. relié, 16×24, de X, 314 p. — ISBN 978-0-8176-4496-3. — Prix : SFr. 95.00. — Birkhäuser, Boston, 2008.

Eisenstein series are an essential ingredient in the spectral theory of automorphic forms and an important tool in the theory of L-functions. They have also been exploited extensively by number theorists for many arithmetic purposes. Bringing together contributions from areas that are not usually interacting with each other, this volume introduces diverse users of Eisenstein series to a variety of important applications. With this juxtaposition of perspectives, the reader obtains deeper insights into the arithmetic of Eisenstein series. The exposition focuses on the common structural properties of Eisenstein series occurring in many related applications that have arisen in several recent developments in arithmetic: Arakelov intersection theory on Shimura varieties, special values of L-functions and Iwasawa theory, and equidistribution of rational/integer points on homogeneous varieties. Key questions that are considered include : Is it possible to identify a class of Eisenstein series whose Fourier coefficients (resp. special values) encode significant arithmetic information? Do such series fit into p-adic families? Are the Eisenstein series that arise in counting problems of this type?

Toshiyuki KOBAYASHI, Wilfried SCHMID, Jae-Hyun YANG, (Editors). — **Representation theory and automorphic forms.** — Progress in mathematics, vol. 255. — Un vol. relié, 16,5×24, de VIII, 210 p. — ISBN 978-0-8176-4505-2. — Prix : SFr. 95.00. — Birkhäuser, Boston, 2008.

This volume addresses the interplay between representation theory and automorphic forms. The invited papers, written by leading mathematicians, track recent progress in the ever expanding fields of representation theory and automorphic forms, and their association with number theory and differential geometry. Representation theory relates to number theory through the Langlands program, which conjecturally connects algebraic extensions of number fields to automorphic representations and L-functions. These are the subject of several of the papers. Multiplicity-free representations constitute another subject, which is approached geometrically via the notion of visible group actions on complex manifolds. Both graduate students and researchers will find inspiration in this volume.

Richard A. MOLLIN. — **Fundamental number theory with applications.** — Second edition. — Discrete mathematics and its applications. — Un vol. relié, 16,5×24,5, de X, 369 p. — ISBN 978-1-4200-6659-3. — Prix : US$94.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2008.

An update of the most accessible introductory number theory text available, *Fundamental Number Theory with Applications, Second Edition* presents a mathematically rigorous yet easy-to-follow treatment of the fundamentals and applications of the subject. The substantial amount

of reorganizing makes this edition clearer and more elementary in its coverage. *New to the second edition*: Removal of all advanced material to be even more accessible in scope. — New fundamental material, including partition theory, generating functions, and combinatorial number theory. — Expanded coverage of random number generation, Diophantine analysis, and additive number theory. — More applications to cryptography, primality testing, and factoring. — An appendix on the recently discovered unconditional deterministic polynomial-time algorithm for primality testing. Taking a truly elementary approach to number theory, this text supplies enough essential material so that novices can acquire a firm grasp on the field. Placed in highlighted boxes to reduce distraction from the main text, nearly 70 biographies focus on major contributors to the field. The presentation of over 1300 entries in the index maximizes cross-referencing so readers can find data with ease. *Features*: Covers all aspects of basic number theory. — Provides a rigorous mathematical presentation. — Explores numerous applications to cryptography. — Presents biographies of notable contributors to the field. — Includes almost 400 exercises, a bibliography, an extensive index, and appendices of background material.

Lawrence C. WASHINGTON. — **Elliptic curves: number theory and cryptography.** — Second edition. — Discrete mathematics and its applications. — Un vol. relié, 16,5×24,5, de XVIII, 513 p. — ISBN 978-1-4200-7146-7. — Prix: US$89.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2008.

Like its predecessor, *Elliptic Curves: Number Theory and Cryptography, Second Edition* develops the theory of elliptic curves to provide a basis for both number theoretic and cryptographic applications. With additional material, this edition offers more comprehensive coverage of the fundamental theory, techniques, and applications of elliptic curves. *New to the second edition*: Chapters on isogenies and hyperelliptic curves. — A discussion of alternative coordinate systems, such as projective, Jacobian, and Edwards coordinates, along with related computational issues. — A more complete treatment of the Weil and Tate-Lichtenbaum pairings. — Doud's analytic method for computing torsion on elliptic curves over **Q**. — An explanation of how to perform calculations with elliptic curves in several popular computer algebra systems. Taking a basic approach to elliptic curves, this accessible book prepares readers to tackle more advanced problems in the field. It introduces elliptic curves over finite fields early in the text, before moving on to interesting applications, such as cryptography, factoring, and primality testing. The book also discusses the use of elliptic curves in Fermat's last theorem. Relevant abstract algebra material on group theory and fields can be found in the appendices.

Corps et polynômes

Jean-Pierre SERRE. — **Topics in Galois theory.** — Second edition. — Research notes in mathematics, vol. 1. — Un vol. relié, 16×23,5, de XVI, 120 p. — ISBN 978-1-56881-412-4. — Prix: US$39.00. — A.K. Peters, Wellesley, Massachusetts, 2008.

These notes are based on *Topics in Galois Theory*, a course given by the author at Harvard University in the fall semester of 1988 and written down by Henri Darmon. The course focused on the inverse problem of Galois theory: the construction of field extensions having a given finite group as Galois group. While proofs are not carried out in full detail, the book contains a number of examples, exercises, and open problems. In the first part, classical methods and results, such as the Scholz and Reichhardt construction for p-groups, $p \neq 2$, as well as Hilbert's irreducibility theorem and the large sieve inequality, are presented. The second part is devoted to rationality and rigidity criteria and their application in realizing certain groups as Galois groups of regular extensions of $\mathbf{Q}(T)$.

Géométrie algébrique

Laurent FARGUES, Alain GENESTIER, Vincent LAFFORGUE. — **L'isomorphisme entre les tours de Lubin-Tate et de Drinfeld.** — Progress in mathematics, vol. 262. — Un vol. relié, 16,5 × 24, de XXII, 406 p. — ISBN 978-3-7643-8455-5. — Prix : SFr. 105.00. — Birkhäuser, Basel, 2008.

Ce livre contient une démonstration détaillée et complète de l'existence d'un isomorphisme équivariant entre les tours p-adiques de Lubin-Tate et de Drinfeld. Le résultat est établi en égales et inégales caractéristiques. Il y est également donné comme application une démonstration du fait que les cohomologies équivariantes de ces deux tours sont isomorphes, un résultat qui a des applications à l'étude de la correspondance de Langlands locale. Au cours de la preuve des rappels et des compléments sont donnés sur la structure des deux espaces de modules précédents, les groupes formels p-divisibles et la géométrie analytique rigide p-adique.

Victor GINZBURG, (Editor). — **Algebraic geometry and number theory : in honor of Vladimir Drinfeld's 50th birthday.** — Progress in mathematics, vol. 253. — Un vol. relié, 16,5 × 24, de XVIII, 643 p. — ISBN 978-0-8176-4471-0. — Prix : SFr. 172.00. — Birkhäuser, Boston, 2006.

One of the most creative mathematicians of our times, Vladimir Drinfeld received the Fields Medal in 1990 for his groundbreaking contributions to the Langlands program and to the theory of quantum groups. These ten original articles by prominent mathematicians, dedicated to Drinfeld on the occasion of his 50th birthday, broadly reflect the range of Drinfeld's own interests in algebra, algebraic geometry, and number theory. — *Contributors* : A. Eskin, V.V. Fock, E. Frenkel, D. Gaitsgory, V. Ginzburg, A.B. Goncharov, E. Hrushovski, Y. Ihara, D. Kazhdan, M. Kisin, I. Krichever, G. Laumon, Yu.I. Manin, A. Okounkov, V. Schechtman, M.A. Tsfasman.

Günter HARDER. — **Lectures on algebraic geometry I : sheaves, cohomology of sheaves, and applications to Riemann surfaces.** — Aspects of mathematics, vol. E 35. — Un vol. relié, 17,5 × 24, de XIV, 290 p. — ISBN 978-3-528-03136-7. — Prix : €54.90. — Vieweg, Wiesbaden, 2008.

This book and the following second volume are an introduction into modern algebraic geometry. In the first volume the methods of homological algebra, theory of sheaves, and sheaf cohomology are developed. These methods are indispensable for modern algebraic geometry, but they are also fundamental for other branches of mathematics and of great interest on their own. In the last chapter of volume I these concepts are applied to the theory of compact Riemann surfaces. In this chapter the author makes clear how influential the ideas of Abel, Riemann and Jacobi were and that many of the modern methods were anticipated by them.

Bernard LE STUM. — **Rigid cohomology.** — Cambridge tracts in mathematics, vol. 172. — Un vol. relié, 16 × 23,5, de XV, 319 p. — ISBN 978-0-521-87524-0. — Prix : £50.00. — Cambridge University Press, Cambridge, 2007.

Dating back to the work of Berthelot, rigid cohomology appeared as a common generalization of Monsky-Washnitzer cohomology and crystalline cohomology. It is a p-adic Weil cohomology, suitable for computing Zeta and L-functions for algebraic varieties on finite fields. Moreover, it is effective, in the sense that it gives algorithms to compute the number of rational points of such varieties. This is the first book to give a complete treatment of the theory, from full discussion of all the basics to descriptions of the very latest developments. Results and proofs are included that are not available elsewhere, local computations are explained, and many

worked examples are given. This accessible tract will be of interest to researchers working in arithmetic geometry, p-adic cohomology theory, and related cryptographic areas.

Rosa M. MIRÓ-ROIG. — **Determinantal ideals.** — Progress in mathematics, vol. 264. — Ferran Sunyer i Balaguer Award winning monograph. — Un vol. relié, 16×24, de XVI, 138 p. — ISBN 978-3-7643-8534-7. — Prix: SFr. 69.90. — Birkhäuser, Basel, 2008.

Determinantal ideals are ideals generated by minors of a homogeneous polynomial matrix. Some classical ideals that can be generated in this way are the ideal of the Veronese varieties, of the Segre varieties, and of the rational normal scrolls. Determinantal ideals are a central topic in both commutative algebra and algebraic geometry, and they also have numerous connections with invariant theory, representation theory, and combinatorics. Due to their important role, their study has attracted many researchers and has received considerable attention in the literature. In this book three crucial problems are addressed: CI-liaison class and G-liaison class of standard determinantal ideals; the multiplicity conjecture for standard determinantal ideals; and unobstructedness and dimension of families of standard determinantal ideals.

Amnon NEEMAN. — **Algebraic and analytic geometry.** — London Mathematical Society lecture note series, vol. 345. — Un vol. broché, 15,5×23, de XII, 420 p. — ISBN 978-0-521-70983-5. — Prix: £40.00. — Cambridge University Press, Cambridge, 2007.

Algebraic geometry is a meeting place in which several strands of knowledge magically converge; why not present it this way? This is intended as a textbook for an undergraduate course in modern algebraic geometry. There are several undergraduate textbooks on the classical, pre-1950s version of the subject, but this is the first attempt to present the modern theory. Its goal is to reveal a broad panoramic picture that also includes glimpses into a wide assortment of pretty vistas, into more specialized areas, each of which is beautiful in its own right. The undergraduate curriculum contains a great deal of analysis and very little algebra or geometry. Because of this imbalance, it seems most natural to present algebraic geometry by highlighting the way it connects algebra and geometry with analysis: the average student will probably be most familiar and most comfortable with the analytic component. The book therefore focuses on Serre's GAGA theorem, which perhaps best encapsulates this link. GAGA provides the unifying theme of the book: we develop enough of the modern machinery of algebraic geometry to be able to give an essentially complete proof. It is something of a pedagogical curiosity that one can give an essentially complete, largely self-contained proof of the theorem, at a level accessible to undergraduates. The book is based on a course which the author has taught, twice, at the Australian National University.

Claire VOISIN. — **Hodge theory and complex algebraic geometry I.** — Cambridge studies in advanced mathematics, vol. 76. — Un vol. broché, 15×23, de IX, 322 p. — ISBN 978-0-521-71801-1 (relié: 978-0521-80260-4). — Prix: £25.99 (relié: £75.00). — Cambridge University Press, Cambridge, 2007.

The first of two volumes offering a modern and unique introduction to Kaehlerian geometry and Hodge structure. The book starts with basic material on complex variables, complex manifolds, holomorphic vector bundles, sheaves and cohomology theory, the latter being treated in a more theoretical way than is usual in geometry. The book culminates with the Hodge decomposition theorem. In between, the author proves the Kaehler identities, which lead to the hard Lefschetz theorem and the Hodge index theorem. The second part of the book investigates the meaning of these results in several directions. Completely self-contained, the book is ideal for students, while its content gives an up-to-date account of Hodge theory and complex algebraic geometry as has been developed by P. Griffiths and his school, by P. Deligne, and

by S. Bloch. The text is complemented by exercises which provide useful results in complex algebraic geometry.

Claire VOISIN. — **Hodge theory and complex algebraic geometry II.** — Cambridge studies in advanced mathematics, vol. 77. — Un vol. broché, 15×23, de IX, 351 p. — ISBN 978-0-521-71802-8 (relié: 978-0-521-80283-3). — Prix: £25.99 (relié: £75.00). — Cambridge University Press, Cambridge, 2007.

The second volume of this modern account of Kaehlerian geometry and Hodge theory starts with the topology of families of algebraic varieties. Proofs of the Lefschetz theorem on hyperplane sections, the Picard-Lefschetz study of Lefschetz pencils, and Deligne theorems on the degeneration of the Leray spectral sequence and the global invariant cycles follow. The main results of the second part are the generalized Noether-Lefschetz theorems, the generic triviality of the Abel-Jacobi maps, and most importantly Nori's connectivity theorem, which generalizes the above. The last part of the book is devoted to the relationships between Hodge theory and algebraic cycles. The book concludes with the example of cycles on Abelian varieties, where some results of Bloch and Beauville, for example, are expounded. The text is complemented by exercises giving useful results in complex algebraic geometry. It will be welcomed by researchers in both algebraic and differential geometry.

Anneaux et algèbres

Piotr A. KRYLOV, Askar A. TUGANBAEV. — **Modules over discrete valuation domains.** — De Gruyter expositions in mathematics, vol. 43. — Un vol. relié, 18×24,5, de IX, 357 p. — ISBN 978-3-11-020053-9. — Prix: €119.63. — Walter de Gruyter, Berlin, 2008.

In this book, modules over a specific class of rings, the discrete valuation domains, are considered. Such modules certainly call for a special consideration, since they have specific properties and play an important role in various areas of algebra, especially of commutative algebra. Typical examples of such domains are rings of p-adic integers and formal power series rings over division rings. The authors consider all main areas of the theory of modules over discrete valuation domains. This includes the presentation of main ideas, methods, and theorems which form a basis of studies in the theory of modules over discrete valuation domains, as well as over some other rings. In addition, close relations between the theory of modules over discrete valuation domains and the theory of Abelian groups are pointed out. The text is accompanied by many exercises, historical remarks, links to related fields and interesting open problems. It is useful for students, graduates studying algebra, young researchers and experts. — *From the contents*: Endomorphism rings of divisible and complete modules. — Representation of rings by endomorphism rings. — Torsion-free modules. — Mixed modules. — Determinity of modules by their endomorphism rings. — Modules with many endomorphisms or automorphisms.

Hyungju PARK, Georg REGENSBURGER, (Editors). — **Gröbner bases in control theory and signal processing.** — Radon series on computational and applied mathematics, vol. 3. — Un vol. relié, 17,5×24,5, de 251 p. — ISBN 978-3-11-019333-6. — Prix: €110.28. — Walter de Gruyter, Berlin, 2007.

This volume contains survey articles and original research papers, presenting the state of the art on applications of Gröbner bases and related methods in control theory and signal processing. The topics covered include: Gröbner bases in multidimensional systems. — The Quillen-Suslin theorem and systems theory. — Statistical signal processing. — Parametric probems in control theory. — Stability of multidimensional input/output systems. — Wavelets and filter design. — Synthesis of multidimensional control systems. — Time-varying linear

systems. The contributions are based on talks delivered at the Special Semester on Gröbner Bases and Related Methods hosted by the Johann Radon Institute for Computational and Applied Mathematics (RICAM) of the Austrian Academy of Sciences in Linz, Austria, in May 2006.

M. ROSENKRANZ, D. WANG, (Editors). — **Gröbner bases in symbolic analysis.** — Radon series on computational and applied mathematics, vol. 2. — Un vol. relié, 17,5×24,5, de 349 p. — ISBN 978-3-11-019323-7. — Prix: €91.59. — Walter de Gruyter, Berlin, 2007.

This volume contains survey articles and original research papers, presenting the state of the art on applying the symbolic approach of Gröbner bases and related methods to differential and difference equations. It covers the computational aspects of algebraic analysis, involutive and Janet bases, differential algebra, Lie groups and invariant theory, initial and boundary conditions. The contributions are based on talks delivered at the Special Semester on Gröbner Bases and Related Methods hosted by the Radon Institute for Computational and Applied Mathematics of the Austrian Academy of Sciences in Linz, Austria, in May 2006.

Catégories, algèbre homologique, cohomologie des groupes

Fred VAN OYSTAEYEN. — **Virtual topology and functor geometry.** — Lecture notes in pure and applied mathematics, vol. 256. — Un vol. broché, 15,5×23,5, de XVIII, 150 p. — ISBN 978-1-4200-6056-0. — Prix: US$99.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2008.

Intrinsically noncommutative spaces today are considered from the perspective of several branches of modern physics, including quantum gravity, string theory, and statistical physics. From this point of view, it is ideal to devise a concept of space and its geometry that is fundamentally noncommutative. Providing a clear introduction to noncommutative topology, *Virtual Topology and Functor Geometry* explores new aspects of these areas as well as more established facets of noncommutative algebra. Presenting the material in an easy, colloquial style to facilitate understanding, the book begins with an introduction to category theory, followed by a chapter on noncommutative spaces. This chapter examines noncommutative lattices, noncommutative opens, sheaf theory, the generalized Stone space, and Grothendieck topology. The author then studies Grothendieck categorical representations to formulate an abstract notion of "affine open". The final chapter proposes a dynamical version of topology and sheaf theory, providing at least one solution of the problem of sheafification independent of generalizations of topos theory. By presenting new ideas for the development of an intrinsically noncommutative geometry, this book fosters the further unification of different kinds of noncommutative geometry and the expression of observations that involve natural phenomena.

K-théorie

Efton PARK. — **Complex topological *K*-theory.** — Cambridge studies in advanced mathematics, vol. 111. — Un vol. relié, 15,5×23,5, de X, 208 p. — ISBN 978-0-521-85634-8. — Prix: £38.00. — Cambridge University Press, Cambridge, 2008.

Topological *K*-theory is a key tool in topology, differential geometry, and index theory, yet this is the first contemporary introduction for graduate students new to the subject. No background in algebraic topology is assumed; the reader need only have taken the standard first courses in real analysis, abstract algebra, and point-set topology. The book begins with a detailed discussion of vector bundles and related algebraic notions, followed by the definition of *K*-theory and proofs of the most important theorems in the subject, such as the Bott periodicity

theorem and the Thom isomorphism theorem. The multiplicative structure of K-theory and the Adams operations are also discussed, and the final chapter details the construction and computation of characteristic classes. With every important aspect of the topic covered, and exercises at the end of each chapter, this is the definitive book for a first course in topological K-theory.

Théorie des groupes et généralisations

Simon R. BLACKBURN, Peter M. NEUMANN, Geetha VENKATARAMAN. — **Enumeration of finite groups.** — Cambridge tracts in mathematics, vol. 173. — Un vol. relié, 16×23,5, de XII, 281 p. — ISBN 978-0-521-88217-0. — Prix: £50.00. — Cambridge University Press, Cambridge, 2007.

How many groups of order n are there? This is a natural question for anyone studying group theory, and this Tract provides an exhaustive and up-to-date account of research into this question spanning almost 50 years. The authors presuppose an undergraduate knowledge of group theory, up to and including Sylow's theorems, a little knowledge of how a group may be presented by generators and relations, a very little representation theory from the perspective of module theory and a very little cohomology theory – but most of the basics are expounded here and the book is more or less self-contained. Although it is principally devoted to a connected exposition of an agreeable theory, the book does also contain some material that has not hitherto been published. It is designed to be used as a graduate text but also as a handbook for established research workers in group theory.

Tullio CECCHERINI-SILBERSTEIN, Fabio SCARABOTTI, Filippo TOLLI. — **Harmonic analysis on finite groups: representation theory, Gelfand pairs and Markov chains.** — Cambridge studies in advanced mathematics, vol. 108. — Un vol. relié, 16×23,5, de XIII, 440 p. — ISBN 978-0-521-88336-8. — Prix: £40.00. — Cambridge University Press, Cambridge, 2008.

Line up a deck of 52 cards on a table. Randomly choose two cards and switch them. How many switches are needed in order to mix up the deck? Starting from a few concrete problems such as the random walk on the discrete circle and the Ehrenfest diffusion model, this book develops the necessary tools for the asymptotic analysis of these processes. This detailed study culminates with the case-by-case analysis of the cut-off phenomenon discovered by Persi Diaconis. This self-contained text is ideal for students and researchers working in the areas of representation theory, group theory, harmonic analysis and Markov chains. Its topics range from the basic theory needed for students new to this area, to advanced topics such as Gelfand pairs, harmonics on posets and the q-analogs, the complete analysis of the random matchings, and a presentation of the representation theory of the symmetric group.

Michael W. DAVIS. — **The geometry and topology of Coxeter groups.** — London Mathematical Society Monographs Series, vol. 32. — Un vol. relié, 16,5×24, de XIV, 584 p. — ISBN 978-0-691-13138-2. — Prix: £50.00. — Princeton University Press, Princeton, 2008.

The Geometry and Topology of Coxeter Groups is a comprehensive and authoritative treatment of Coxeter groups from the viewpoint of geometric group theory. Groups generated by reflections are ubiquitous in mathematics, and there are classical examples of reflection groups in spherical, Euclidean, and hyperbolic geometry. Any Coxeter group can be realized as a group generated by reflection on a certain contractible cell complex, and this complex is the principal subject of this book. The book explains a theorem of Moussong that demonstrates that a polyhedral metric on this cell complex is nonpositively curved, meaning that Coxeter groups are "CAT(0) groups." The book describes the reflection group trick, one of the most potent sources

of examples of aspherical manifolds. And the book discusses many important topics in geometric group theory and topology, including Hopf's theory of ends; contractible manifolds and homology spheres; the Poincaré Conjecture; and Gromov's theory of CAT(0) spaces and groups. Finally, the book examines connections between Coxeter groups and some of topology's most famous open problems concerning aspherical manifolds, such as the Euler Characteristic Conjecture and the Borel and Singer conjectures.

Mesure et intégration

David M. Bressoud. — **A radical approach to Lebesgue's theory of integration.** — MAA textbooks. — Un vol. broché, 18×25,5, de xiv, 329 p. — ISBN 978-0-521-71183-8 (relié: 978-0-521-88474-7). — Prix: £35.00 (relié: £60.00). — Cambridge University Press, Cambridge, 2008.

Meant for advanced undergraduate and graduate students in mathematics, this lively introduction to measure theory and Lebesgue integration is rooted in and motivated by the historical questions that led to its development. The author stresses the original purpose of the definitions and theorems and highlights some of the difficulties that were encountered as these ideas were refined. The story begins with Riemann's definition of the integral, a definition created so that he could understand how broadly one could define a function and yet have it be integrable. The reader then follows the efforts of many mathematicians who wrestled with the difficulties inherent in the Riemann integral, leading to the work in the late nineteenth and early twentieth centuries of Jordan, Borel, and Lebesgue, who finally broke with Riemann's definition. Ushering in a new way of understanding integration, they opened the door to fresh and productive approaches to many of the previously intractable problems of analysis.

Gerald Edgar. — **Measure, topology, and fractal geometry.** — Second edition. — Undergraduate texts in mathematics. — Un vol. relié, 16×24,5, de xv, 268 p. — ISBN 978-0-387-74748-4. — Prix: €39.95. — Springer, New York, 2008.

For the second edition of this highly regarded textbook, Gerald Edgar has made numerous additions and changes, in an attempt to provide a clearer and more focused exposition. The most important addition is an increased emphasis on the packing measure, so that now it is often treated on a par with the Hausdorff measure. The topological dimensions were rearranged for Chapter 3, so that the covering dimension is the major one, and the inductive dimensions are the variants. A "reduced cover class" notion was introduced to help in proofs for Method I or Method II measures. Research results since 1990 that affect these elementary topics have been taken into account. Some examples have been added, including Barnsley leaf and Julia set, and most of the figures have been re-drawn.

Fonctions d'une variable complexe

Steven G. Krantz. — **Complex variables: a physical approach with applications and MATLAB®.** — Textbooks in mathematics. — Un vol. relié, 18,5×26, de xviii, 421 p. —ISBN 978-1-58488-580-1. — Prix: US$99.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2008.

From the algebraic properties of a complete number field, to the analytic properties imposed by the Cauchy integral formula, to the geometric qualities originating from conformality, *Complex Variables: a Physical Approach with Applications and MATLAB®* explores all facets of this subject, with particular emphasis on using theory in practice. The first five chapters

encompass the core material of the book. These chapters cover fundamental concepts, holomorphic and harmonic functions, Cauchy theory and its applications, and isolated singularities. Subsequent chapters discuss the argument principle, geometric theory, and conformal mapping, followed by a more advanced discussion of harmonic functions. The author also presents a detailed glimpse of how complex variables are used in the real world, with chapters on Fourier and Laplace transforms as well as partial differential equations and boundary value problems. The final chapter explores computer tools, including *Mathematica*®, Maple™ and MATLAB®, that can be employed to study complex variables. Each chapter contains physical applications drawing from the areas of physics and engineering. Offering a unique approach to complex analysis, this text provides readers with a powerful toolkit for future work in the mathematical sciences. *Features*: Presents complex analysis as a natural continuation of calculus. — Discusses the use of computer algebra systems in complex analysis. — Features applications from physics and engineering, including those involving differential equations. — Integrates MATLAB® exercises and examples throughout. — Contains stimulating exercises at the drill, theory, and exploration levels. — Includes numerous figures to clarify key concepts in complex variable theory. — Provides appendices with solutions to select exercises, a glossary, a list of notations, and a guide to the literature.

Fonctions de plusieurs variables complexes

Shiferaw Berhanu, Paulo D. Cordaro, Jorge Hounie. — **An introduction to involutive structures.** — New mathematical monographs, vol. 6. — Un vol. relié, 16×23,5, de xii, 392 p. — ISBN 978-0-521-87857-9. — Prix: £55.00. — Cambridge University Press, Cambridge, 2008.

Detailing the main methods in the theory of involutive systems of complex vector fields, this book examines the major results from the last 25 years in the subject. One of the key tools of the subject – the Baouendi-Trèves approximation theorem – is proved for many function spaces. This, in turn, is applied to questions in partial differential equations and several complex variables. Many basic problems such as regularity, unique continuation, and boundary behaviour of the solutions are explored. The local solvability of systems of partial differential equations is studied in some detail. The book provides a solid background for beginners in the field and also contains a treatment of many recent results, which will be of interest to researchers in the subject.

Équations différentielles ordinaires

M.A. Al-Gwaiz. — **Sturm-Liouville theory and its applications.** — Springer undergraduate mathematics series. — Un vol. broché, 18×23,5, de x, 264 p. — ISBN 978-1-84628-971-2. — Prix: €32.95. — Springer, London, 2008.

Undergraduate textbooks on Fourier series which follow a pointwise approach to convergence miss the rich geometric content which comes with treating the subject within the inner product space L^2. This book, developed from a course taught to senior undergraduates, provides a unified introduction to Fourier analysis and special functions based on the Sturm-Liouville theory in L^2. The basic results of this theory, namely the orthogonality and completeness of its eigenfunctions, are established in Chapter 2; the remaining chapters present examples and applications. The last two chapters, on Fourier and Laplace transformations, while not part of the Sturm-Liouville theory, extend the Fourier series method for representing

functions to integral representations. The treatment relies heavily on the convergence properties of sequences and series of numbers as well as functions, and assumes a solid background in advanced calculus and an acquaintance with ordinary differential equations and linear algebra. Familiarity with the relevant theorems of real analysis, such as the Ascoli-Arzelà theorem, is also useful for following the proofs. The presentation follows a clear and rigorous mathematical style that is both readable and well motivated, with many examples and applications used to illustrate the theory. Although addressed primarily to undergraduate students of mathematics, the book will also be of interest to students in related disciplines, such as physics and engineering, where Fourier analysis and special functions are used extensively for solving linear differential equations.

Jane CRONIN. — **Ordinary differential equations: introduction and qualitative theory.** — Third edition. — Pure and applied mathematics, vol. 292. — Un vol. relié, 16,5 × 24,5, de XIX, 381 p. — ISBN 978-0-8247-2337-8. — Prix: US$89.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2008.

Requiring only a background in advanced calculus and linear algebra, *Ordinary Differential Equations: Introduction and Qualitative Theory, Third Edition*, includes basic material such as the existence and properties of solutions, linear equations, autonomous equations, and stability as well as more advanced topics in periodic solutions of nonlinear equations. This third edition provides a detailed account of the Bendixson theory of solutions of two-dimensional nonlinear autonomous equations, which is a classical subject that has become more prominent in recent biological applications. By using the Poincaré method, it gives a unified treatment of the periodic solutions of perturbed equations. This includes the existence and stability of periodic solutions of perturbed nonautonomous and autonomous equations (bifurcation theory). The text shows how topological degree can be applied to extend the results. It also explains that using the averaging method to seek such periodic solutions is a special case of the use of the Poincaré method. — *Features:* Illustrates existence theorems with various examples, such as Volterra equations for predator-prey systems, Hodgkin-Huxley equations for nerve conduction, the Field-Noyes model for the Belousov-Zhabotinsky reaction, and Goodwin equations for a chemical reaction system. — Provides a detailed account of the Bendixson theory of solutions of two-dimensional autonomous systems. — Presents a unified treatment of the perturbation problem for periodic solutions, covering the Poincaré method, autonomous systems, and bifurcation problems. — Shows how topological degree is used to obtain significant extensions of perturbation theory. — Describes how the averaging method is used to study periodic solutions.

Fritz SCHWARZ. — **Algorithmic Lie theory for solving ordinary differential equations.** — Pure and applied mathematics, vol. 291. — Un vol. relié, 16,5 × 24,5, de X, 434 p. — ISBN 978-1-58488-889-5. — Prix: US$89.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2008.

Despite the fact that Sophus Lie's theory was virtually the only systematic method for solving nonlinear ordinary differential equations (ODEs), it was rarely used for practical problems because of the massive number of calculations involved. But with the advent of computer algebra programs, it became possible to apply Lie theory to concrete problems. Taking this approach, *Algorithmic Lie Theory for Solving Ordinary Differential Equations* serves as a valuable introduction for solving differential equations using Lie's theory and related results. After an introductory chapter, the book provides the mathematical foundation of linear differential equations, covering Loewy's theory and Janet bases. The following chapters present results from the theory of continuous groups of a 2-D manifold and discuss the close relation between Lies's symmetry analysis and the equivalence problem. The core chapters of the book identify the symmetry classes to which quasilinear equations of order two or three belong and

transform these equations to canonical form. The final chapters solve the canonical equations and produce the general solutions whenever possible as well as provide concluding remarks. The appendices contain solutions to selected exercises, useful formulae, properties of ideals of monomials, Loewy decompositions, symmetries for equations from Kamke's collection, and a brief description of the software system ALLTYPES for solving concrete algebraic problems.

Équations aux dérivées partielles

Herbert AMANN, Wolfgang ARENDT, Matthias HIEBER, Frank NEUBRANDER, Serge NICAISE, Joachim VON BELOW, (Editors). — **Functional analysis and evolution equations: the Günter Lumer volume.** — Un vol. relié, 17,5×24, de XX, 636 p. — ISBN 3-7643-7793-9. — Prix: SFr. 169.00. — Birkhäuser, Basel, 2008.

Günter Lumer was an outstanding mathematician whose work has great influence on the research community in mathematical analysis and evolution equations. He was at the origin of the breath-taking development the theory of semigroups saw after the pioneering book of Hille and Phillips of 1957. This volume contains invited contributions presenting the state of the art of these topics and reflecting the broad interests of Günter Lumer.

Systèmes dynamiques et théorie ergodique

Vasile STAICU, (Editor). — **Differential equations, chaos and variational problems.** — Progress in nonlinear differential equations and their applications, vol. 75. — Un vol. relié, 16,5×24, de XIII, 435 p. — ISBN 978-3-7643-8481-4. — Prix: SFr. 259.00. — Birkhäuser, Basel, 2008.

Differential equations are a fast evolving branch of mathematics and one of the mathematical tools most used by scientists and engineers. This book gathers a collection of original articles and state-of-the-art contributions, written by highly distinguished researchers working in differential equations, delay-differential equations, differential inclusions, variational problems, Young measures, control theory, dynamical systems, chaotic systems and their relations with physical systems. The forefront of research in these areas is represented in this volume. The book and all contributions are dedicated to Arrigo Cellina and James A. Yorke on their 65th birthdays. Their remarkable scientific career covered all the above areas and was one of the main driving forces behind the work of many of the authors and the editor of this volume. For researchers and graduate students in mathematics, physics and engineering, the material in this book will be a valuable resource, and a tool for everyone working in differential equations, chaos and variational problems. It brings the reader to the frontiers of research in the areas mentioned above and will stimulate further research.

Analyse fonctionnelle

Bryan P. RYNNE, Martin A. YOUNGSON. — **Linear functional analysis.** — Second edition. — Springer undergraduate mathematics series. — Un vol. broché, 18×23,5, de X, 324 p. — ISBN 978-1-84800-004-9. — Prix: €32.95. — Springer, London, 2008.

This introduction to the ideas and methods of linear functional analysis shows how familiar and useful concepts from finite-dimensional linear algebra can be extended or generalized to infinite-dimensional spaces. Aimed at advanced undergraduates in mathematics and physics, the

book assumes a standard background of linear algebra, real analysis (including the theory of metric spaces), and Lebesgue integration, although an introductory chapter summarizes the requisite material. The initial chapters develop the theory of infinite-dimensional normed spaces, in particular Hilbert spaces, after which the emphasis shifts to studying operators between such spaces. Functional analysis has applications to a vast range of areas of mathematics; the final chapters discuss the particularly important areas of integral and differential equations. Further highlights of the second edition include: a new chapter on the Hahn-Banach theorem and its applications to the theory of duality (this chapter also introduces the basic properties of projection operators on Banach spaces, and weak convergence of sequences in Banach spaces — topics that have applications to both linear and nonlinear functional analysis); extended coverage of the uniform boundedness theorem; plenty of exercises, with solutions provided at the back of the book.

Théorie des opérateurs

Joseph A. BALL, Yuli EIDELMAN, J. William HELTON, Vadim OLSHEVSKY, James ROVNYAK, (Editors). — **Recent advances in matrix and operator theory.** — Operator theory: advances and applications, vol. 179. — Un vol. relié, 17,5×24, de VI, 338 p. — ISBN 978-3-7643-8538-5. — Prix: SFr. 259.00. — Birkhäuser, Basel, 2008.

This book expands the lectures given at IWPTA'05 (International Workshop on Operator Theory and Applications) which was held at the University of Connecticut, Storrs, USA, July 24-27, 2005. Many developments at the cutting edge of research in operator theory, matrix theory, coding theory, system theory, control theory and numerical linear algebra are reflected in this collection of original articles. This volume is of a cross-disciplinary nature. A number of papers are devoted to the analysis and algorithms for matrices with quasiseparable structure which is an active area of concurrent research in numerical linear algebra.

Vladimir MÜLLER. — **Spectral theory of linear operators and spectral systems in Banach algebras.** — Second edition. — Operator theory: advances and applications, vol. 139. — Un vol. relié, 17,5×24, de VIII, 439 p. — ISBN 978-3-7643-8264-3. — Prix: SFr. 219.00. — Birkhäuser, Basel, 2007.

This book is dedicated to the spectral theory of linear operators on Banach spaces and of elements in Banach algebras. It presents a survey of results concerning various types of spectra, both of single and n-tuples of elements. Typical examples are the one-sided spectra, the approximate point, essential, local and Taylor spectrum, and their variants. The theory is presented in a unified, axiomatic and elementary way. Many results appear here for the first time in a monograph. The material is self-contained. Only a basic knowledge of functional analysis, topology, and complex analysis is assumed. The present second edition contains a number of new results, in particular, concerning orbits and their relations to the invariant subspace problem.

Géométrie

Walter BENZ. — **Classical geometries in modern contexts: geometry of real inner product spaces.** — Second edition. — Un vol. relié, 17,5×24, de XII, 277 p. — ISBN 978-3-7643-8540-8. — Prix: SFr. 139.00. — Birkhäuser, Basel, 2007.

This book is based on real inner product spaces X of arbitrary (finite or infinite) dimension greater than or equal to 2. With natural properties of (general) translations and general distances

of X, Euclidean and hyperbolic geometries are characterized. For these spaces X also the sphere geometries of Möbius and Lie are studied (besides Euclidean and hyperbolic geometry), as well as geometries where Lorentz transformations play the key role. The geometrical notions of this book are based on general spaces X as described. This implies that also mathematicians who have not so far been especially interested in geometry may study and understand great ideas of classical geometries in modern and general contexts. Proofs of newer theorems, characterizing isometries and Lorentz transformations under mild hypotheses are included, like for instance infinite dimensional versions of famous theorems of A.D. Alexandrov on Lorentz transformations. A real benefit is the dimension-free approach to important geometrical theories. Only prerequisites are basic linear algebra and basic 2- and 3-dimensional real geometry.

Géométrie différentielle

Alexander I. Bobenko, Peter Schröder, John M. Sullivan, Günter M. Ziegler, (Editors). — **Discrete differential geometry.** — Oberwolfach Seminars, vol. 38. — Un vol. broché, 17×24, de x, 341 p. — ISBN 978-3-7643-8620-7. — Prix: SFr. 49.90. — Birkhäuser, Basel, 2008.

Discrete differential geometry is an active mathematical terrain where differential geometry and discrete geometry meet and interact. It provides discrete equivalents for the geometric concepts and methods of differential geometry, such as notions of curvature and integrability for polyhedral surfaces. Current progress in this field is to a large extent stimulated by its relevance for computer graphics and mathematical physics. This collection of essays, which documents the main lectures of the 2004 Oberwolfach Seminar on the topic as well as a number of additional contributions by key participants, gives a lively, multifaceted introduction to this emerging field.

Charles P. Boyer, Krzysztof Galicki. — **Sasakian geometry.** — Oxford mathematical monographs. — Un vol. relié, 16,5×24, de xi, 613 p. — ISBN 978-0-19-856495-9. — Prix: £75.00. — Cambridge University Press, Cambridge, 2008.

This book is an extensive monograph on Sasakian manifolds, focusing on the intricate relationship between Kähler and Sasakian geometries. The subject is introduced by discussion of several background topics, including the theory of Riemannian foliations, compact complex and Kähler orbifolds, and the existence and obstruction theory of Kähler-Einstein metrics on complex compact orbifolds. There is then a discussion of contact and almost contact structures in the Riemannian setting, in which compact quasi-regular Sasakian manifolds emerge as algebraic objects. There is an extensive discussion of the symmetries of Sasakian manifolds, leading to a study of Sasakian structures on links of isolated hypersurface singularities. This is followed by an in-depth study of compact Sasakian manifolds in dimensions three and five. The final section of the book deals with the existence of Sasaki-Einstein metrics. 3-Sasakian manifolds and the role of Sasakian-Einstein geometry in string theory are discussed separately.

Thomas E. Cecil. — **Lie sphere geometry: with applications to submanifolds.** — Second edition. — Universitext. — Un vol. broché, 15,5×23,5, de xii, 208 p. — ISBN 978-0-387-74655-5. — Prix: €39.95. — Springer, New York, 2008.

This book provides a clear and comprehensive modern treatment of Lie sphere geometry and its applications to the study of Euclidean submanifolds. It begins with the construction of the space of spheres, including the fundamental notions of oriented contact, parabolic pencils of spheres, and Lie sphere transformations. The link with Euclidean submanifold theory is established via the Legendre map, which provides a powerful framework for the study of

submanifolds, especially those characterized by restrictions on their curvatures spheres. This new edition contains revised sections on taut submanifolds, compact proper Dupin submanifolds, reducible Dupin submanifolds, and the cyclides of Dupin. Completely new material on isoparametric hypersurfaces in spheres and Dupin hypersurfaces with three and four principal curvatures is also included. The author surveys the known results in these fields and indicates directions for further research and wider application of the methods of Lie sphere geometry.

Topologie des variétés, analyse globale et analyse des variétés

David BORTHWICK. — **Spectral theory of infinite-area hyperbolic surfaces.** — Progress in mathematics, vol. 256. — Un vol. relié, 16,5 × 24,5, de XI, 355 p. — ISBN 978-0-8176-4524-3. — Prix: SFr. 85.00. — Birkhäuser, Boston, 2007.

This book introduces geometric spectral theory in the context of infinite-area Riemann surfaces, providing a comprehensive account of dramatic recent developments in the field. These developments were prompted by advances in geometric scattering theory in the early 1990s which provided new tools for the study of resonances. Hyperbolic surfaces provide an ideal context in which to introduce these new ideas, with technical difficulties kept to a minimum. The spectral theory of hyperbolic surfaces is a point of intersection for a great variety of areas, including quantum physics, discrete groups, differential geometry, number theory, complex analysis, spectral theory, and ergodic theory. The book highlights these connections, at a level accessible to graduate students and researchers from a wide range of fields. Topics covered include an introduction to the geometry of hyperbolic surfaces, analysis of the resolvent of the Laplacian, characterization of the spectrum, scattering theory, resonances and scattering poles, the Selberg zeta function, the Poisson formula, distribution of resonances, the inverse scattering problem, Patterson-Sullivan theory, and the dynamical approach to the zeta function.

Danny CALEGARI. — **Foliations and the geometry of 3-manifolds.** — Oxford mathematical monographs. — Un vol. relié, 16 × 24, de XIV, 363 p. — ISBN 978-0-19-857008-0. — Prix: £ 60.00. — Oxford University Press, Oxford, 2007.

This unique reference, aimed at research topologists, gives an exposition of the 'pseudo-Anosov' theory of foliations of 3-manifolds. This theory generalizes Thurston's theory of surface automorphisms and reveals an intimate connection between dynamics, geometry and topology in 3 dimensions. Significant themes returned to throughout the text include the importance of geometry, especially the hyperbolic geometry of surfaces, the importance of monotonicity, especially in 1-dimensional and co-dimensional dynamics, and combinatorial approximation, using finite combinatorical objects such as train-tracks, branched surfaces and hierarchies to carry more complicated continuous objects.

Peter KRONHEIMER, Tomasz MROWKA. — **Monopoles and three-manifolds.** — New mathematical monographs, vol. 10. — Un vol. relié, 16 × 23,5, de XII, 796 p. — ISBN 978-0-521-88022-0. — Prix: £ 75.00. — Cambridge University Press, Cambridge, 2007.

Originating with Andreas Floer in the 1980s, Floer homology has proved to be an effective tool in tackling many important problems in three- and four-dimensional geometry, and topology. This book provides a comprehensive treatment of Floer homology, based on the Seiberg-Witten monopole equations. After first providing an overview of the results, the authors develop the analytic properties of the Seiberg-Witten equations, assuming only a basic grounding in differential geometry and analysis. The Floer groups of a general three-manifold are then defined, and their properties studied in detail. Two final chapters are devoted to the calculation of the Floer groups, and to applications of the theory in topology. Suitable for

beginning graduate students and researchers, this book provides the first full discussion of a central part of the study of the topology of manifolds since the mid 1990s.

Loring W. Tu. — **An introduction to manifolds.** — Universitext. — Un vol. broché, 15,5×23,5, de XV, 360 p. — ISBN 978-0-387-48098-5. — Prix: €39.95. — Springer, New York, 2008.

Manifolds, the higher-dimensional analogs of smooth curves and surfaces, are fundamental objects in modern mathematics. Combining aspects of algebra, topology, and analysis, manifolds have also been applied to classical mechanics, general relativity, and quantum field theory. In this streamlined introduction to the subject, the theory of manifolds is presented with the aim of helping the reader achieve a rapid mastery of the essential topics. By the end of the book the reader should be able to compute, at least for simple spaces, one of the most basic topological invariants of a manifold, its de Rham cohomology. Along the way the reader acquires the knowledge and skills necessary for further study of geometry and topology. The requisite point-set topology is included in an appendix of twenty pages; other appendices review facts from real analysis and linear algebra. Hints and solutions are provided to many of the exercises and problems.

Probabilités et processus stochastiques

Bernard Bercu, Djalil Chafaï. — **Modélisation stochastique et simulation: cours et applications.** — Sciences sup. — Mathématiques appliquées pour le master/SMAI. — Un vol. broché, 17×24, de XIII, 335 p. — ISBN 978-2-10-051379-6. — Prix: €33.00. — Dunod, Paris, 2007.

Ce livre place la simulation au cœur des probabilités et de la statistique. Il est principalement destiné aux étudiants qui ont déjà suivi un enseignement de base dans ces domaines. L'accent est volontairement mis sur la structure et sur l'intuition. Le cours associe résultats théoriques, modèles et algorithmes stochastiques, ainsi qu'une large variété d'applications illustrées par des programmes informatiques en Matlab-Octave (téléchargeables à partir du site web dunod.com). L'ouvrage est destiné aux étudiants en master de mathématiques appliquées, élèves ingénieurs, candidats au CAPES ou à l'agrégation.

Robert C. Dalang, Marco Dozzi, Francesco Russo, (Editors). — **Seminar on stochastic analysis, random fields and applications V: Centro Stefano Franscini, Ascona, May 2005.** — Progress in probability, vol. 59. — Un vol. relié, 16×24, de XIII, 519 p. — ISBN 978-3-7643-8457-9. — Prix: SFr. 219.00. — Birkhäuser, Basel, 2008.

This volume contains twenty-eight refereed research or review papers presented at the 5th Seminar on Stochastic Processes, Random Fields and Applications, which took place at the Centro Stefano Franscini (Monte Verità) in Ascona, Switzerland, from May 30 to June 3, 2005. The seminar focused mainly on stochastic partial differential equations, random dynamical systems, infinite-dimensional analysis, approximation problems, and financial engineering. The book will be a valuable resource for researchers in stochastic analysis and professionals interested in stochastic methods in finance.

Bernt Øksendal, Agnès Sulem. — **Applied stochastic control of jump diffusions.** — Second edition. — Universitext. — Un vol. broché, 15,5×23,5, de XIII, 257 p. — ISBN 978-3-540-69825-8. — Prix: €39.95. — Springer, Berlin, 2007.

The main purpose of the book is to give a rigorous, yet mostly nontechnical, introduction to the most important and useful solution methods of various types of stochastic control problems

for jump diffusions and its applications. The types of control problems covered include classical stochastic control, optimal stopping, impulse control and singular control. Both the dynamic programming method and the maximum principle method are discussed, as well as the relation between them. Corresponding verification theorems involving the Hamilton-Jacobi Bellman equation and/or (quasi-) variational inequalities are formulated. There are also chapters on the viscosity solution formulation and numerical methods. The text emphasizes applications, mostly to finance. All the main results are illustrated by examples and exercises appear at the end of each chapter with complete solutions. This will help the reader understand the theory and see how to apply it. The book assumes some basic knowledge of stochastic analysis, measure theory and partial differential equations. In the 2nd edition there is a new chapter on optimal control of stochastic partial differential equations driven by Lévy processes. There is also a new section on optimal stopping with delayed information. Moreover, corrections and other improvements have been made.

Pierre VALLOIS. — **Modélisations stochastiques et simulations.** — Un vol. broché, 16,5 × 24, de 287 p. — ISBN 978-2-7298-3664-1. — Prix : €32.00. — Ellipses, Paris, 2007.

Ce livre a pour thème la modélisation stochastique. Depuis plusieurs années on observe une utilisation intensive des probabilités et de la statistique dans de nombreux domaines de recherches, par exemple la médecine, la biologie, les marchés financiers, les télécommunications, etc. L'objectif de cet ouvrage est de donner des bases solides quant à la modélisation et à la simulation de variables ou processus aléatoires. Une des originalités du livre est de mettre en évidence l'apport indispensable des logiciels de mathématiques dans la modélisation. Le logiciel choisi est ici MAPLE. Le livre s'adresse à un lecteur qui connaît les concepts de base des probabilités. Le niveau requis est celui qui correspond à un premier cours de probabilités post-baccalauréat. Il est en particulier destiné aux étudiants de troisième année de licence scientifique ou de master, aux étudiants d'écoles d'ingénieurs ainsi qu'à tout chercheur intéressé par la modélisation stochastique. Son contenu est aussi adapté à l'épreuve de modélisation en probabilités de l'agrégation de mathématiques.

Statistique

Hans-Otto GEORGII. — **Stochastics: introduction to probability and statistics.** — Translated by Marcel Ortgiese, Ellen Baake and the author. — De Gruyter textbook. — Un vol. broché, 17 × 24, de IX, 370 p. — ISBN 978-3-11-019145-5. — Prix: €37.34. — Walter de Gruyter, Berlin, 2008.

This book is a translation of the third edition of the well-accepted German textbook *Stochastik*, which presents the fundamental ideas and results of both probability theory and statistics, and comprises the material of a one-year course. It is addressed to students of mathematics, as well as scientists and computer scientists with an interest in the mathematical side of stochastics. The stochastic concepts, models and methods are motivated by examples and then developed and analysed systematically. Some measure theory is included, but this is done at an elementary level that is in accordance with the introductory character of the book. A large number of problems offer applications and supplements to the text. — *From the contents: Probability theory:* Principles of modeling chance. — Stochastic standard models. — Conditional probabilities and independence. — Expectation and variance. — The law of large numbers and the central limit theorem. — Markov chains. — *Statistics:* Estimation. — Confidence regions. — Around the normal distributions. — Hypothesis testing. — Asymptotic tests and rank tests. — Regression models and analysis of variance.

Jürg KOHLAS, Paul-André MONNEY. — **Statistical information: assumption-based statistical inference.** — Sigma series in stochastics, vol. 3. — Un vol. broché, 17×24, de XII, 170 p. — ISBN 978-3-88538-303-1. — Prix: €32.00. — Heldermann Verlag, Lemgo, 2008.

Jakob Bernoulli proposed in his famous *Ars Conjectandi* to distinguish pure and mixed arguments in reasoning under uncertainty. These ideas have been neglected in probability theory and statistics until the path breaking work of A. Dempster and G. Shafer. The latter work has been further developed in Fribourg into a theory of probabilistic argumentation systems, which combines logic and probability into a unified theory of inference under uncertainty. It has numerous applications in artificial intelligence, diagnostics, reliability, etc. The proposed book on "Statistical Information" applies this new theory to statistical inference. It shows that in this way the competing formalisms of Bayesian and Fisher's fiducial probabilities can be seen as special cases of a more general theory. This book is a first and unique presentation of assumption-based inference in statistics. It opens the way to a new view of statistical inference.

Stephan MORGENTHALER. — **Introduction à la statistique.** — Troisième édition revue et augmentée. — Enseignement des mathématiques. — Un vol. broché, 16×24, de XII, 385 p. — ISBN 978-2-88074-734-3. — Prix: SFr. 69.50. — Presses polytechniques et universitaires romandes, Lausanne, 2007.

Première introduction en statistique et en probabilités, cet ouvrage traite les méthodes les plus courantes et donne une base théorique. Le contenu étant structuré en quatre parties, l'introduction (statistique exploratoire) consiste en une discussion sur les données susceptibles d'être soumises à une analyse statistique. La deuxième partie (calcul des probabilités) est une initiation concise au calcul des probabilités, d'abord pour les événements, ensuite pour des variables aléatoires. La troisième partie (idées fondamentales de la statistique) présente brièvement les approches majeures de la statistique, c'est-à-dire l'estimation et les méthodes inférentielles. Enfin, la dernière partie (méthodes statistiques) aborde différents outils statistiques. Ouvrage de référence pour les étudiants ingénieurs (premier cours de statistique) et les chercheurs, complété par des exercices, il est conçu comme support pour un cours de deux semestres. Il peut également servir d'outil aux autodidactes intéressés par les bases et applications des méthodes statistiques.

Analyse numérique

Charles L. BYRNE. — **Applied iterative methods.** — Second edition. — Un vol. relié, 16×23,5, de XX, 376 p. — ISBN 978-1-56881-342-4. — Prix: US$79.00. — A.K. Peters, Wellesley, Massachusetts, 2008.

With an emphasis on the technique's broad spectrum of practical applications, Charles Byrne's *Applied Iterative Methods* provides a thorough treatment of the iterative approach, one of the most fundamental processes used in numerical analysis. It is the first book to present subjects such as optimization, convex analysis, and approximation theory organized around a detailed and mathematically sound treatment of iterative algorithms. Such algorithms are used for problem solving in a diverse range of fields. The most notable is medical imaging: emission and transmission tomography, magnetic-resonance imaging, and intensity-modulated radiation therapy all rely on the iterative process. SONAR, RADAR, satellite imaging, and other forms of remote sensing also employ iterative optimization algorithms. The book gives a unified treatment of many of these algorithms, with its content presented in finite-dimensional settings, avoiding the need for advanced mathematics. Unique in its cohesive treatment of a diverse array of algorithms, this book serves as a self-contained guide for those interested in exploring the

many applications of this technique. Introductory material is presented and exercises are included at the end of most chapters.

J. KRAUS, U. LANGER, (Editors). — **Lectures on advanced computational methods in mechanics.** — Radon series on computational and applied mathematics, vol. 1. — Un vol. relié, 17,5×24,5, de IX, 226 p. — ISBN 978-3-11-019556-9. — Prix : €72.90. — Walter de Gruyter, Berlin, 2007.

This book contains four survey papers related to different topics in computational mechanics, in particular novel discretization and solver techniques in mechanics and inverse, control, and optimization problems in mechanics. These topics were considered in lectures, seminars, tutorials, and workshops at the Special Semester on Computational Mechanics held at the Johann Radon Institute for Computational and Applied Mathematics (RICAM) of the Austrian Academy of Sciences, Linz, Austria, October 3 – December 16, 2005. — B. Kaltenbacher, M. Kaltenbacher : Modeling and iterative identification of hysteresis via Preisach operators in PDEs. — J. Kraus, S. Margenov : Multilevel methods for anisotropic elliptic problems. — S. Nepomnyaschikh : Domain decomposition methods. — S. Repin : A posteriori error estimation methods for partial differential equations.

Alexander A. SAMARSKII, Peter N. VABISHCHEVICH. — **Numerical methods for solving inverse problems of mathematical physics.** — Inverse and ill-posed problems series. — Un vol. relié, 18×24,5, de XIV, 438 p. — ISBN 978-3-11-019666-5. — Prix : €138.32. — Walter de Gruyter, Berlin, 2007.

In direct problems for mathematical physics, the solution of partial differential equations supplemented with some boundary and initial conditions is to be determined. In many applications some of these conditions are missing, e.g., initial or boundary conditions, coefficients and right-hand sides of the equation may be unknown. Those problems are called inverse problems, and quite frequently, those problems turn out to be ill-posed, requiring some regularization methods for their approximate solution. In the present monograph, the main classes of inverse problems in mathematical physics and their numerical treatment are considered. Many numerical illustrations and codes for their realization are included. The book is intended for graduate students and scientists interested in applied mathematics, computational mathematics and mathematical modelling.

Économie, recherche opérationnelle, jeux

József BECK. — **Combinatorial games: tic-tac-toe theory.** — Encyclopedia of mathematics and its applications, vol. 114. — Un vol. relié, 16×24, de XIV, 732 p. — ISBN 978-0-521-46100-9. — Prix : £85.00. — Cambridge University Press, Cambridge, 2008.

Traditional game theory has been successful at developing strategy in games of incomplete information: when one player knows something that the other does not. But it has little to say about games of complete information, for example, tic-tac-toe, solitaire, and hex. This is the subject of combinatorial game theory. Most board games are a challenge for mathematics: to analyze a position one has to examine the available options, and then the further options available after selecting any option, and so on. This leads to combinatorial chaos, where brute force study is impractical. In this comprehensive volume, József Beck shows readers how to escape from the combinatorial chaos via the fake probabilistic method, a game-theoretic adaptation of the probabilistic method in combinatorics. Using this, the author is able to determine the exact results about infinite classes of many games, leading to the discovery of some striking new duality principles.

Steven J. BRAMS. – **The presidential election game.** — Second edition. — Un vol. broché, 15,5 × 23, de XXII, 194 p. — ISBN 978-1-56881-348-6. — Prix : US$29.00. — A.K. Peters, Wellesley, Massachusetts, 2008.

The Presidential Election Game may change the way you think about presidential elections and, for that matter, American politics in general. This analytic treatment of strategy in the race for the presidency, from the primaries to the general election, uses modern game theory and decision theory to demonstrate why certain campaign strategies are more effective than others. Brams supports his thorough analysis with historical evidence, and in applying scientific modelling to presidential elections in clear and understandable language, Brams adds a new dimension to the study of this important aspect of American politics. This book, which has recently been featured in publications such as the Chicago Tribune and the Baltimore Sun, presents material that can help readers make sense of the complexities of today's political campaigns.

Curtis R. VOGEL. — **Computational methods for inverse problems.** — Frontiers in applied mathematics, vol. 23. — Un vol. broché, 18 × 25,5, de XVI, 183 p. — ISBN 978-0-898715-50-7. — Prix : £31.99. — Society for Industrial and Applied Mathematics, Philadelphia, 2002, distributed by Cambridge University Press, Cambridge.

Inverse problems arise in a number of important practical applications, ranging from biomedical imaging to seismic prospecting. This book provides the reader with a basic understanding of both the underlying mathematics and the computational methods used to solve inverse problems. It also addresses specialized topics like image reconstruction, parameter identification, total variation methods, nonnegativity constraints, and regularization parameter selection methods. Because inverse problems typically involve the estimation of certain quantities based on indirect measurements, the estimation process is often ill-posed. Regularization methods, which have been developed to deal with this ill-posedness, are carefully explained in the early chapters of *Computational Methods for Inverse Problems*. The book also integrates mathematical and statistical theory with applications and practical computational methods, including topics like maximum likelihood estimation and Bayesian estimation. Several web-based resources are available to make this monograph interactive, including a collection of MATLAB m-files used to generate many of the examples and figures. These resources enable readers to conduct their own computational experiments in order to gain insight. They also provide templates for the implementation of regularization methods and numerical solution techniques for other inverse problems. Moreover, they include some realistic test problems to be used to develop and test various numerical methods. *Computational Methods for Inverse Problems* is intended for graduate students and researchers in applied mathematics, engineering, and the physical sciences who may encounter inverse problems in their work.

Systèmes, contrôle

Jean-Baptiste HIRIART-URRUTY. — **Les mathématiques du mieux faire. Volume 1 : premiers pas en optimisation.** — Opuscules, vol. 8. — Un vol. broché, 14,5 × 19, de IX, 132 p. — ISBN 978-2-7298-3667-2. — Prix : €15.00. — Ellipses, Paris, 2008.

L'usage français du verbe «optimiser» nous est arrivé vers le milieu du XIX^{e} siècle d'Angleterre, où *to optimize* signifiait «se comporter en optimiste» ; on peut donc dire que l'optimiseur est comme l'optimiste qui pense pouvoir toujours mieux faire. Mais ce n'est que dans la deuxième moitié du XX^{e} siècle que les mathématiciens, motivés par les demandes issues des applications, ont été conduits à poser les fondations modernes des «mathématiques du mieux

faire», matière principale de ces deux Opuscules (nº 8 et 9) sur l'optimisation et la commande optimale. Ces *Premiers pas en optimisation* sont destinés à un large public, dans un souci de popularisation des bases mathématiques de l'optimisation vers des domaines utilisateurs partiels, intéressés, ou potentiels: automatique, économie mathématique, analyse numérique, statistique, etc. Dans notre présentation, l'accent a été mis sur les idées davantage que sur les techniques ou généralisations que le lecteur plus intéressé aura tout loisir de développer.

Jean-Baptiste HIRIART-URRUTY. — **Les mathématiques du mieux faire. Volume 2: la commande optimale pour les débutants.** — Opuscules, vol. 9. — Un vol. broché, 14,5 × 19, de XI, 163 p. — ISBN 978-2-7298-3737-2. — Prix: €15.00. — Ellipses, Paris, 2008.

Commander un système physique, mécanique, économique, évoluant avec le temps, de façon à lui faire faire quelque chose de manière optimale (selon divers critères choisis), voilà un objectif qui apparaît dans bien des domaines d'applications des sciences de l'ingénieur. Ce n'est que dans la deuxième moitié du XX^{e} siècle que les ingénieurs, automaticiens et mathématiciens, motivés par les demandes issues des applications, ont été conduits à poser les fondations modernes de ce volet des «mathématiques du mieux faire»: la théorie de la commande optimale. Cet opuscule *La commande optimale pour les débutants* est destiné à un large public, dans un souci de popularisation des bases mathématiques de la commande optimale vers des domaines utilisateurs partiels, intéressés, ou potentiels: l'automatique, le spatial, l'économie, la robotique, etc. Notre présentation se borne à une initiation, l'accent est mis sur les idées de base; beaucoup d'exemples d'illustration accompagnent les résultats fondamentaux.