Bulletin bibliographique

Généralités

David ACHESON. — **Mathémagic : de π au chaos : pourquoi les maths sont si réjouissantes !** — Traduction de l'anglais : Frédéric JAËCK. — Un vol. relié, 15,5 × 20,5, de 173 p. — ISBN 978-2-7011-7686-4. — Prix : €15.00. — Belin, Paris, 2013.

Avec beaucoup d'humour, le physicien David Acheson nous présente sa vision des mathématiques : un univers magique, immédiatement accessible et avant tout ludique, où le plaisir de raisonner domine. Les multiples énigmes, observations troublantes, constructions géométriques et manipulations de chiffres en tout genre proposées sont les jalons d'un voyage extravagant à la Lewis Carroll, qui n'oublie pas les applications les plus remarquables de la discipline. De π au pendule chaotique, de Pythagore à Andrew Wiles qui démontra le théorème énoncé par Pierre de Fermat 350 ans plus tôt, embarquez pour une fascinante balade au pays des mathématiques ! De savoureuses illustrations achèveront de convaincre le profane comme l'initié qu'il s'agit là d'un des livres les plus réjouissants jamais écrit sur le sujet.

Aurélien ALVAREZ (Dir.) ; Marie-Claude ARNAUD, Michèle AUDIN, François BEGUIN, Arnaud CHERITAT, Etienne GHYS, Frédéric LE ROUX, Marie LHUISSIER, Patrick MASSOT, Laurent ROLLET, Jean-Christophe YOCCOZ. — **Destination systèmes dynamiques avec Poincaré**. — Voyages en mathématiques. — Un vol. broché, 14,5 × 22, de 146 p. — ISBN 978-2-7465-0707-4. — Prix : €19.00. — Le Pommier, Paris, 2013.

Prévoir l'avenir… calculer le futur… Vraiment ?! Peut-on prévoir la position des rebonds d'une boule de billard ? Calculer où sera précisément la Terre dans quelques centaines de milliers d'années ? Sauf peut-être pour Madame Irma, prédire le devenir d'un système en évolution au cours du temps n'est pas chose facile ! Henri Poincaré s'est très tôt passionné pour les systèmes dynamiques en proposant un regard nouveau sur des questions parfois fort anciennes. Aujourd'hui, les mathématiciens étudient beaucoup de systèmes dynamiques de nature bien différente les uns des autres. Sous une apparente simplicité se cache parfois une dynamique extrêmement riche et compliquée… subtile et belle ! C'est un voyage guidé dans cette branche des mathématiques que nous vous proposons ici ; c'est aussi l'occasion de revenir sur quelques traits plus inattendus de cet immense savant qu'est Poincaré.

Aurélien ALVAREZ (Dir.) ; Arnaud CHERITAT, Etienne GHYS, Tan LEI, Jos LEYS, Julien MARCHE, Patrick MASSOT, Christian MERCAT, Luis PARIS, Patrick POPESCU-PAMPU. — **Destination géométrie et topologie avec Thurston**. — Voyages en mathématiques. — Un vol. broché, 14,5 × 22, de 156 p. — ISBN 978-2-7465-0708-1. — Prix : €19.00. — Le Pommier, Paris, 2013.

Topologie… géométrie… en petites dimensions ? Mais késako ?! La topologie est la science qui étudie les formes en général et s'intéresse notamment aux courbes ou aux surfaces ; les topologues aiment bien d'ailleurs couper leurs surfaces le long de certaines courbes pour les recoller suivant d'autres… Les géomètres, quant à eux, sont familiers des distances, des mesures d'angles comme on l'apprend à l'école. S'appuyant sur des intuitions très géométriques, le mathématicien William Thurston a proposé à la fin des années 1970 un programme de recherche pour comprendre la forme de tous les espaces de dimension 3, bouleversant par la même occasion notre façon d'appréhender ces espaces. Ce programme fut finalement mené à son terme dans les années 2000 par le mathématicien Grigori Perelman d'une manière tout aussi grandiose ! C'est un voyage guidé dans quelques-unes de ces mathématiques que nous vous proposons ici.

Keith DEVLIN. — **Les énigmes mathématiques du 3e millénaire**. — Poche – Le Pommier, vol. 47. — Un vol. broché, 11 × 18, de 328 p. — ISBN 978-2-7465-0704-3. — Prix : €12.00. — Paris, Le Pommier, 2013.

En 2000, la fondation Clay annonça l'ouverture d'une compétition historique : quiconque résoudra l'un des sept problèmes mathématiques extraordinairement difficiles – choisis par un comité international de mathématiciens reconnus – et dont la solution sera confirmée par les experts, gagnera 1 million de dollars ! 100 ans plus tôt, le mathématicien David Hilbert avait déjà proposé un ensemble de 23 problèmes qui occupèrent l'agenda des mathématiciens au XX^{e} siècle. Les problèmes du 3ème millénaire sont de même stature et leurs solutions joueront un rôle déterminant dans le cours des mathématiques du XXI^{e} siècle. Dans ce livre, Keith Devlin nous présente avec beaucoup de clarté les Everest des mathématiques contemporaines qu'il reste à grimper ! A la fois fascinant et accessible à tout lecteur qui peut se rappeler un peu des mathématiques apprises au lycée.

Lance FORTNOW. — **The golden ticket : P, NP, and the search for the impossible**. — Un vol. relié, 16 × 24, de X, 176 p. — ISBN 978-0-691-15649-1. — Prix : £18.95. — Princeton University Press, Princeton, 2013.

The *P–NP* problem is the most important open problem in computer science, if not all of mathematics. Simply stated, it asks whether every problem whose solution can be quickly checked by computer can also be quickly solved by computer. *The Golden Ticket* provides a nontechnical introduction to *P–NP,* its rich history, and its algorithmic implications for everything we do with computers and beyond. In this informative and entertaining book, Lance Fortnow traces how the problem arose during the Cold War on both sides of the Iron Curtain, and gives examples of the problem from a variety of disciplines, including economics, physics, and biology. He explores problems that capture the full difficulty of the *P–NP* dilemma, from discovering the shortest route through all the rides at Disney World to finding large groups of friends on Facebook. But difficulty also has its advantages. Hard problems allow us to safely conduct electronic commerce and maintain privacy in our online lives.

Ronald L. GRAHAM, Jaroslav NEŠETŘIL, Steve BUTLER, (Editors). — **The mathematics of Paul Erdős I**. — Second edition. — Un vol. relié, 16 × 24,5, de XIX, 563 p. — ISBN 978-1-4614-7257-5. — Prix : US$149.00. — Springer, New York, 2013.

Ronald L. GRAHAM, Jaroslav NEŠETŘIL, Steve BUTLER, (Editors). — **The mathematics of Paul Erdős II**. — Second edition. — Un vol. relié, 16 × 24, de XIX, 607 p. — ISBN 978-1-4614-7253-7. — Prix : US$149.0. — Springer, New York, 2013.

This is the most comprehensive survey of the mathematical life of the legendary Paul Erdős (1913–1996), one of the most versatile and prolific mathematicians of our time. For the first time, all the main areas of Erdős' research are covered in a single project. Because of overwhelming response from the mathematical community, the project now occupies over 1000 pages, arranged into two volumes. These volumes contain both high level research articles as well as key articles that survey some of the cornerstones of Erdős' work, each written by a leading world specialist in the field. A special chapter "Early Days", rare photographs, and art related to Erdős complement this striking collection. A unique contribution is the bibliography on Erdős' publications : the most comprehensive ever published. This new edition, dedicated to the 100th anniversary of Paul Erdős' birth, contains updates on many of the articles from the two volumes of the first edition, several new articles from prominent mathematicians, a new introduction, and more biographical information about Paul Erdős with an updated list of publications. The first volume contains the unique chapter "Early Days", which features personal memories of Paul Erdős by a number of his colleagues. The other three chapters cover number theory, random methods, and geometry. All of these chapters are essentially updated, most notably the geometry chapter that covers the recent solution of the problem on the number of distinct distances in finite planar sets, which was the most popular of Erdős' favorite geometry problems. The second volume contains chapters on graph theory and combinatorics, extremal and Ramsey theory, and a section on infinity that covers Erdős' research on set theory. All of these chapters are essentially updated, particularly the extremal theory chapter that contains a survey of flag algebras, a new technique for solving extremal problems.

Dean HATHOUT. — **Wearing Gauss's jersey**. — Un vol. relié, 16×23,5, de XVII, 257 p. — ISBN 978-1-4665-0864-4. — Prix : US$24.00. — CRC Press, Boca Raton, 2013.

Wearing Gauss's Jersey focuses on "Gauss problems", problems that can be very tedious and time consuming when tackled in a traditional, straightforward way but if approached in a more insightful fashion, can yield the solution much more easily and elegantly. The book shows how mathematical problem solving can be fun and how students can improve their mathematical insight, regardless of their initial level of knowledge. Illustrating the underlying unity in mathematics, it also explores how problems seemingly unrelated on the surface are actually extremely connected to each other. Each chapter starts with easy problems that demonstrate the simple insight/mathematical tools necessary to solve problems more efficiently. The text then uses these simple tools to solve more difficult problems, such as Olympiad-level problems, and develop more complex mathematical tools. The longest chapters investigate combinatorics as well as sequences and series, which are some of the most well-known Gauss problems. These topics would be very tedious to handle in a straightforward way but the book shows that there are easier ways of tackling them.

Thomas HAWKINS. — **The mathematics of Frobenius in context : a journey through 18th to 20th Century mathematics**. — Sources and studies in the history of mathematics and physical sciences. — Un vol. relié, 16×24,5, de XIII, 699 p. — ISBN 978-1-4614-6332-0. — Prix : €116.00. — Springer, New York, 2013.

Frobeniusis best known as creator of the theory of group characters and representations, but his name is attached to a multitude of theorems and concepts from a broad spectrum of mathematical disciplines. In this book his mathematics is presented "in context" in two senses. The first provides the reader with the historical background necessary to understand why Frobenius undertook to solve a particular problem and to appreciate the magnitude of his achievement. Part of the context involves Frobenius' training in the Berlin school of mathematics presided over by Weierstrass, Kronecker, and Kummer, from whom he learned disciplinary ideals as well as theorems. Frobenius' mathematics is also presented "in context" in that the author traces the ways in which his work was subsequently applied, developed, and ultimately incorporated into present-day mathematics. As a consequence of the contextual approach, the reader will encounter a broad swath of diverse and important strands of 18th–20th century mathematics, ranging from the work of Lagrange and Laplace on stability of linear systems of differential equations to the theory of complex abelian varieties. The book is divided into three parts. Part I provides an overview of Frobenius' entire mathematical career and thus serves as an introduction to the main body of the book. Here, within the framework of his educational and professional career, his contributions to mathematics and the attendant backgrounds are briefly sketched and their subsequent impact upon the development of mathematics indicated. Part II presents the development of core aspects of linear algebra up to and including the work of Weierstrass and Kronecker. The chapters of Part III deal in depth with Frobenius' major works and can be read independently of one another. Thomas Hawkins was awarded the MAA Chauvenet Prize for expository writing and was the first recipient of the AMS Whiteman Prize for historical exposition. His last book was *Emergence of the Theory of Lie Groups* (Springer, 2000).

David JERISON, Mark KISIN, Tomasz MROWKA, Richard STANLEY, Horng-Tzer YAU, Shing-Tung YAU, (Editors). — **Current developments in mathematics 2012**. — Un vol. broché, 18×25,5, de 260 p. — ISBN 978-1-57146-240-4. — Prix : US$48.00. — International Press, Sommerville, 2013.

Papers based on selected lectures given at the Current Development in Mathematics (CDM) conference, held in November 2012 at Harvard University. The CDM conference is an annual seminar, jointly hosted by Harvard University and the Massachusetts Institute of Technology, and devoted to surveying the most recent developments in all areas of mathematics. In choosing lecturers for each conference, the committee members take a broad look at the various areas of mathematics, and select lecturers who are not only prominent specialists in their fields, but also transcend classical perceptions within their fields.

Yvette KOSSMAN-SCHWARZBACH, (Éditeur). — **Siméon-Denis Poisson : les mathématiques au service de la science**. — Histoire des mathématiques et des sciences physiques. — Un vol. broché, 17 × 24,5, de XIII, 522 p. — ISBN 978-2-7302-1584-8. — Prix : €28.00. — Éditions de l'École Polytechnique, Palaiseau, 2013.

Composé d'articles historiques et scientifiques, ce livre présente l'œuvre du mathématicien et physicien Siméon-Denis Poisson (1781–1840). Élève, puis professeur à l'École Polytechnique, académicien, chargé de hautes fonctions dans l'organisation de l'enseignement en France, il fut l'auteur de très nombreux mémoires de mathématiques et de physique mathématique. Sont examinés ici les rapports de Poisson avec ses contemporains, en particulier avec Lagrange et Laplace, ses travaux sur la mécanique, l'électromagnétisme, l'optique, la capillarité et l'élasticité, ses publications sur le mouvement des planètes, sur l'algèbre et sur l'analyse, et son oeuvre en probabilités et en statistique, dont la célèbre "loi de Poisson". Ce livre contient des contributions à l'histoire des équations de la mécanique, à l'histoire de la géométrie symplectique et de la géométrie de Poisson. Les "crochets de Poisson" considérés par Poisson en 1809 y jouent un rôle essentiel. Plusieurs des textes qui composent ce livre furent écrits en 1981 à l'occasion du bicentenaire de la naissance du savant et alors rassemblés en un recueil, édité par M. Métivier, P. Costabel et P. Dugac, et publié par l'École Polytechnique. Ils sont réédités ici avec six articles nouveaux rédigés pour le présent volume. Tous sont dus à des chercheurs réputés en histoire des sciences, mécanique, géométrie, probabilités, ou physique mathématique. Ce livre s'adresse à tous les lecteurs intéressés par l'histoire de la science et par les développements récents issus des travaux de Poisson.

Peter D. LAX, Maria Shea TERRELL. — **Calculus with applications**. — Second edition. — Undergraduate texts in mathematics. — Un vol. relié, 16 × 24, de XII, 503 p. — ISBN 978-1-4614-7945-1. — Prix : €47.00. — Springer, New York, 2014.

This new edition of Lax, Burstein, and Lax's *Calculus with Applications and Computing* offers meaningful explanations of the important theorems of single variable calculus. Written with students in mathematics, the physical sciences, and engineering in mind, and revised with their help, it shows that the themes of calculation, approximation, and modeling are central to mathematics and the main ideas of single variable calculus. This edition brings the innovation of the first edition to a new generation of students. New sections in this book use simple, elementary examples to show that when applying calculus concepts to approximations of functions, uniform convergence is more natural and easier to use than point-wise convergence. As in the original, this edition includes material that is essential for students in science and engineering, including an elementary introduction to complex numbers and complex-valued functions, applications of calculus to modeling vibrations and population dynamics, and an introduction to probability and information theory.

Colm MULCAHY. — **Mathematical card magic : fifty-two new effects**. — An A. K. Peters book. — Un vol. relié, 18,5 × 26, de XXV, 354 p. — ISBN 978-1-4665-0976-4. — Prix : US$34.95. — CRC Press, Boca Raton, 2013.

Mathematical card effects offer both beginning and experienced magicians an opportunity to entertain with a minimum of props. Featuring mostly original creations, *Mathematical Card Magic : Fifty-Two New Effects* presents an entertaining look at new mathematically based card tricks. Each chapter contains four card effects, generally starting with simple applications of a particular mathematical principle and ending with more complex ones. Practice a handful of the introductory effects and, in no time, you'll establish your reputation as a "mathemagician". Delve a little deeper into each chapter and the mathematics gets more interesting. The author explains the mathematics as needed in an easy-to-follow way. He also provides additional details, background, and suggestions for further explorations. Suitable for recreational math buffs and amateur card lovers or as a text in a first-year seminar, this color book offers a diverse collection of new mathemagic principles and effects.

Peter ROQUETTE. — **Contributions to the history of number theory in the 20th Century**. — Heritage of European mathematics. — Un vol. relié, 17,5 × 24,5, de XI, 278 p. — ISBN 978-3-03719-113-2. — Prix : €78.00. — European Mathematical Society, Zürich, 2013.

The 20th century was a time of great upheaval and great progress, mathematics not excluded. In order to get the overall picture of trends, developments and results it is illuminating to look at their manifestations locally, in the personal life and work of people living at the time. The university archives of Göttingen harbor a wealth of papers, letters and manuscripts from several generations of mathematicians – documents which tell us the story of the historic developments from a local point of view. The present book offers a number of essays based on documents from Göttingen and elsewhere – essays which are not yet contained in the author's Collected Works. These little pieces, independent from each other, are meant as contributions to the imposing mosaic of history of number theory. They are written for mathematicians but with no special background requirements. Involved are the names of Abraham Adrian Albert, Cahit Arf, Emil Artin, Richard Brauer, Otto Grün, Helmut Hasse, Klaus Hoechsmann, Robert Langlands, Heinrich-Wolfgang Leopoldt, Emmy Noether, Abraham Robinson, Ernst Steinitz, Hermann Weyl and others.

Alexander A. Roytvarf. — **Thinking in problems: how mathematicians find creative solutions**. — Un vol. relié, 16×24, de XXXVII, 405 p. — ISBN 978-0-8176-8405-1. — Prix: €63.25. — Birkhäuser/Springer, New York, 2013.

This concise, self-contained textbook gives an in-depth look at problem-solving from a mathematician's point-of-view. Each chapter builds off the previous one, while introducing a variety of methods that could be used when approaching any given problem. Creative thinking is the key to solving mathematical problems, and this book outlines the tools necessary to improve the reader's technique. The text is divided into twelve chapters, each providing corresponding hints, explanations, and finalization of solutions for the problems in the given chapter. For the reader's convenience, each exercise is marked with the required background level. This book implements a variety of strategies that can be used to solve mathematical problems in fields such as analysis, calculus, linear and multilinear algebra and combinatorics. It includes applications to mathematical physics, geometry, and other branches of mathematics. Also provided within the text are real-life problems in engineering and technology. *Thinking in Problems* is intended for advanced undergraduate and graduate students in the classroom or as a self-study guide. Prerequisites include linear algebra and analysis.

Jacques Sesiano. — **Récréations mathématiques au Moyen Âge**. — Un vol. broché, 16×24, de VII, 290 p. — ISBN 978-2-88074-498-4. — Prix: SFr. 54.00. — Presses polytechniques et universitaires romandes, Lausanne, 2014.

On trouve souvent dans les manuscrits médiévaux enseignant les mathématiques pratiques, outre un bref exposé théorique et diverses applications en lien avec des questions de la vie quotidienne et du commerce, des problèmes que l'on qualifierait aujourd'hui de récréatifs. S'appuyant sur des situations peu vraisemblables, voire parfois absurdes, ils avaient comme but d'aiguiser la réflexion de l'étudiant et de lui présenter les mathématiques sous un jour nouveau, moins rébarbatif et plus amusant. Cet ouvrage en décrit les principaux types. Il propose successivement des questions de répartition égale de liquide à l'aide soit de transvasements soit de distribution de tonneaux aux contenus inégaux; la recherche du nombre minimal de poids nécessaires à une pesée donnée; puis des problèmes de partages, de robinets, de poursuites, de grands nombres, d'arrangements particuliers, de traversées d'un fleuve à l'aide d'une barque par des couples; ensuite, des déterminations de liens familiaux insolites, des constructions de carrés magiques et de trajets du cavalier; enfin, les paradoxes des ensembles infinis et la découverte de nombres inconnus ou d'objets cachés. A la croisée de l'histoire et des mathématiques, ce livre s'adresse tout à la fois aux spécialistes (étudiants et enseignants en mathématiques, médiévistes) et à un plus large public tenté par le dépaysement d'une immersion dans la vie quotidienne et intellectuelle du Moyen Age.

Daniel Sondaz. — **Fonctions différentiables: L3, Masters, CAPES, Agrégation**. — Bien maîtriser les mathématiques. — Un vol. broché, 15×20,5, de IV, 145 p. — ISBN 978-2-36493-075-9. — Prix: €23.00. — Cépaduès-Editions, Toulouse, 2013.

Cet ouvrage d'introduction au calcul différentiel s'adresse aux étudiants de L3 de Mathématiques, de Masters de Mathématiques Pures et Appliquées, aux étudiants des Écoles d'Ingénieurs, ainsi qu'aux étudiants qui préparent le C.A.P.E.S. et l'Agrégation de Mathématiques. Il introduit la notion d'application différentiable définie entre espaces de Banach. Il étudie ensuite les principales propriétés de telles applications, en insistant

notamment sur le théorème de la moyenne et le théorème de Schwarz. 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 peut ainsi progresser à son rythme dans cette discipline. Les exercices proposés permettent aussi au lecteur de maîtriser un large spectre d'exemples. Une fois ces notions assimilées, celui-ci pourra sans difficultés s'engager dans des études plus avancées.

Histoire

Jérôme GAVIN, Alain SCHÄRLIG. — **Longtemps avant l'algèbre : la fausse position ou comment on a posé le faux pour connaître le vrai, des Pharaons aux temps modernes**. — Un vol. broché, 16 × 24, de 222 p. — ISBN 978-2-88074-984-2. — Prix : SFr. 58.00. — Presses polytechniques et universitaires romandes, Lausanne, 2012.

Choisir une réponse, forcément fausse ; faire la preuve, et regarder de combien est l'erreur ; comparer avec le résultat espéré ; et appliquer un raisonnement de proportionnalité, qui donne la solution juste ! C'est la méthode de la « fausse position », qui a permis pendant des millénaires de se passer de l'algèbre. Les auteurs en ont trouvé la trace dans toute l'histoire du calcul : chez les anciens Égyptiens dix-neuf siècles avant notre ère, chez les Chinois deux siècles avant celle-ci, chez les anciens Grecs, dans le monde arabe, en latin, en vieil italien, en vieil allemand, en vieux français et en vieil anglais. Et ils en ont tiré les meilleurs exemples, présentés en langue originale, puis traduits et commentés en français. Après tous ces témoignages, on ne regarde plus les Anciens comme avant. On prend conscience qu'une tradition importante de l'histoire des mathématiques est tombée dans l'oubli, après avoir été la reine des méthodes de calcul.

Logique et fondements

Henk BARENDREGT, Wil DEKKERS, Richard STATMAN. — **Lambda calculus with types**. — Perspectives in logic. — Un vol. relié, 18 × 25,5, de XXII, 833 p. — ISBN 978-0-521-76614-2. — Prix : £60.00. — Cambridge University Press, Cambridge, 2013.

This handbook with exercises reveals in formalisms, hitherto mainly used for hardware and software design and verification, unexpected mathematical beauty. The lambda calculus forms a prototype universal programming language, which in its untyped version is related to Lisp, and was treated in the first author's classic *The Lambda Calculus* (1984). The formalism has since been extended with types and used in functional programming (Haskell, Clean) and proof assistants (Coq, Isabelle, HOL), used in designing and verifying IT products and mathematical proofs. In this book, the authors focus on three classes of typing for lambda terms : simple types, recursive types and intersection types. It is in these three formalisms of terms and types that the unexpected mathematical beauty is revealed. The treatment is authoritative and comprehensive, complemented by an exhaustive bibliography, and numerous exercises are provided to deepen the readers' understanding and increase their confidence using types.

Noam GREENBERG, Joel David HAMKINS, Denis HIRSCHFELDT, Russell MILLER, (Editors). — **Effective mathematics of the uncountable**. — Lecture notes in logic. — Un vol. relié, 16 × 24, de VIII, 197 p. — ISBN 978-1-107-01451-0. — Prix : £55.00. — Cambridge University Press, Cambridge, 2013.

Classical computable model theory is most naturally concerned with countable domains. There are, however, several methods – some old, some new – that have extended its basic concepts to uncountable structures. Unlike in the classical case, however, no single dominant approach has emerged, and different methods reveal different aspects of the computable content of uncountable mathematics. This book contains introductions to eight major approaches to computable uncountable mathematics : descriptive set theory ; infinite time Turing machines ; Blum-Shub-Smale computability ; Sigma-definability ; computability theory on admissible ordinals ; E-recursion theory ; local computability ; and uncountable reverse mathematics. This book provides an authoritative and multifaceted introduction to this exciting new area of research that is still in its early stages. It is ideal as both an introductory text for graduate and advanced undergraduate students, and a source of interesting new approaches for researchers in computability theory and related areas.

Analyse combinatoire

Krishnaswami ALLADI, Peter PAULE, James SELLERS, Ae Ja YEE, (Editors). — **Combinatory analysis**. — Dedicated to George Andrews. — Developments in mathematics, vol. 32. — Un vol. relié, 16 × 24, de VIII, 472 p. — ISBN 978-1-4614-7857-7. — Prix : €100.21. — Springer, New York, 2013.

George Andrews is one of the most influential figures in number theory and combinatorics. In the theory of partitions and q-hypergeometric series and in the study of Ramanujan's work, he is the unquestioned leader. To suitably honor him during his 70$^{\text{th}}$ birthday year, an international conference on Combinatory Analysis was held at The Pennsylvania State University, December 5–7, 2008. Three issues of *The Ramanujan Journal* comprising Volume 23 were published in 2010 as the refereed proceedings of that conference. In view of the great interest that the mathematical community has in the influential work of Andrews, it was decided to republish Volume 23 of *The Ramanujan Journal* in book form, so that the refereed proceedings are more readily available for those who do not subscribe to the journal but wish to possess this volume. The broad range of areas covered during the conference included the many facets of the theory of partitions, single and multi-variable q-hypergeometric series, various aspects of Ramanujan's mathematics, analytic number theory, and combinatorial number theory — areas which collectively were classified under the heading of Combinatory Analysis by MacMahon and his contemporaries in the early part of the twentieth century. As a fitting tribute to George Andrews, many speakers from the conference contributed research papers to this volume, which deals with a broad range of areas that signify the research interests of George Andrews. In reproducing Volume 23 of *The Ramanujan Journal* in this book form, we have included two relevant papers that appeared in other issues of the journal.

Robin PEMANTLE, Mark C. WILSON. — **Analytic combinatorics in several variables**. — Cambridge studies in advanced mathematics, vol. 140. — Un vol. relié, 15,5 × 23,5, de XIIII, 380 p. — ISBN 978-1-107-03157-9. — Prix : £45.00. — Cambridge University Press, Cambridge, 2013.

This book is the first to treat the analytic aspects of combinatorial enumeration from a multivariate perspective. Analytic combinatorics is a branch of enumeration that uses analytic techniques to estimate combinatorial quantities : generating functions are defined and their coefficients are then estimated via complex contour integrals. The multivariate case involves techniques well known in other areas of mathematics but not in combinatorics. Aimed at graduate students and researchers in enumerative combinatorics, the book contains all the necessary background, including a review of the uses of generating functions in combinatorial enumeration as well as chapters devoted to saddle point analysis, Groebner bases, Laurent series and amoebas, and a smattering of differential and algebraic topology. All software along with other ancillary material can be located via the book's website, http://www.cs.auckland.ac.nz/~mcw/Research/mvGF/asymultseq/ACSVbook/.

Roberto TAMASSIA, (Editor). — **Handbook of graph drawing and visualization**. — Discrete mathematics and its applications. — Un vol. relié, 18,5 × 26, de XIII, 851 p. — ISBN 978-1-58488-412-5. — Prix : US$99.95. — CRC Press, Boca Raton, 2014.

The *Handbook of Graph Drawing and Visualization* provides a broad, up-to-date survey of the field of graph drawing. It covers topological and geometric foundations, algorithms, software systems, and visualization applications in business, education, science, and engineering. Each chapter is self-contained and includes extensive references. The first several chapters of the book deal with fundamental topological and geometric concepts and techniques used in graph drawing, such as planarity testing and embedding, crossings and planarization, symmetric drawings, and proximity drawings. The following chapters present a large collection of algorithms for constructing drawings of graphs, including tree, planar straight-line, planar orthogonal and polyline, spine and radial, circular, rectangular, hierarchical, and three-dimensional drawings as well as labeling algorithms, simultaneous embeddings, and force-directed methods. The book then introduces the GraphML language for representing graphs and their drawings and describes three software systems for constructing drawings of graphs : OGDF, GDToolkit, and PIGALE. The final chapters illustrate the use of graph drawing methods in visualization applications for biological networks, computer security, data analytics, education, computer networks, and social networks. Edited by a pioneer in graph drawing and with contributions from leaders in the graph drawing research community, this handbook shows how graph drawing and visualization can be applied in the physical, life, and social sciences. Whether you

are a mathematics researcher, IT practitioner, or software developer, the book will help you understand graph drawing methods and graph visualization systems, use graph drawing techniques in your research, and incorporate graph drawing solutions in your products.

Théorie des nombres

Martin AIGNER. — **Markov's theorem and 100 years of the uniqueness conjecture : a mathematical journey from irrational numbers to perfect matchings**. — Un vol. relié, 16 × 24, de X, 257 p. — ISBN 978-3-319-00887-5. — Prix : SFr. 93.00. — Springer, Cham, 2013.

This book takes the reader on a mathematical journey, from a number-theoretic point of view, to the realm of Markov's theorem and the uniqueness conjecture, gradually unfolding many beautiful connections until everything falls into place in the proof of Markov's theorem. What makes the Markov theme so attractive is that it appears in an astounding variety of different fields, from number theory to combinatorics, from classical groups and geometry to the world of graphs and words. On the way, there are also introductory forays into some fascinating topics that do not belong to the standard curriculum, such as Farey fractions, modular and free groups, hyperbolic planes, and algebraic words. The book closes with a discussion of the current state of knowledge about the uniqueness conjecture, which remains an open challenge to this day. All the material should be accessible to upper-level undergraduates with some background in number theory, and anything beyond this level is fully explained in the text. This is not a monograph in the usual sense concentrating on a specific topic. Instead, it narrates in five parts – Numbers, Trees, Groups, Words, Finale – the story of a discovery in one field and its many manifestations in others, as a tribute to a great mathematical achievement and as an intellectual pleasure, contemplating the marvellous unity of all mathematics.

Krishnaswami ALLADI, Manjul BHARGAVA, David SAVITT, Pham Huu TIEP, (Editors). — **Quadratic and higher degree forms**. — Developments in mathematics, vol. 31. — Un vol. relié, 16 × 24, de IX, 298 p. — ISBN 978-1-4614-7487-6. — Prix : €89.00. — Springer, New York, 2013.

In the last decade, the areas of quadratic and higher degree forms have witnessed dramatic advances. This volume is an outgrowth of three seminal conferences on these topics held in 2009, two at the University of Florida and one at the Arizona Winter School. The volume also includes papers from the two focused weeks on quadratic forms and integral lattices at the University of Florida in 2010. Topics discussed include the links between quadratic forms and automorphic forms, representation of integers and forms by quadratic forms, connections between quadratic forms and lattices, and algorithms for quaternion algebras and quadratic forms. The book will be of interest to graduate students and mathematicians wishing to study quadratic and higher degree forms, as well as to established researchers in these areas. *Quadratic and Higher Degree Forms* contains research and semi-expository papers that stem from the presentations at conferences at the University of Florida as well as survey lectures on quadratic forms based on the instructional workshop for graduate students held at the Arizona Winter School. The survey papers in the volume provide an excellent introduction to various aspects of the theory of quadratic forms starting from the basic concepts and provide a glimpse of some of the exciting questions currently being investigated. The research and expository papers present the latest advances on quadratic and higher degree forms and their connections with various branches of mathematics.

Pascale CHARPIN, Alexander POTT, Arne WINTERHOF, (Editors). — **Finite fields and their applications : character sums and polynominals**. — Radon series on computational and applied mathematics, vol. 11. — Un vol. relié, 17,5 × 24,5 de XI, 274 p. — ISBN 978-3-11-028240-5. — Prix : €119.95. — De Gruyter, Berlin/Boston, 2013.

This book is based on the invited talks of the "RICAM-Workshop on Finite Fields and Their Applications : Character Sums and Polynomials" held at the Federal Institute for Adult Education (BIfEB) in Strobl, Austria, from September 2–7, 2012. Finite fields play important roles in many application areas such as coding theory, cryptography, Monte Carlo and quasi-Monte Carlo methods, pseudorandom number generation, quantum computing, and wireless communication. In this book we will focus on sequences, character sums, and

polynomials over finite fields in view of the above mentioned application areas: Chapters 1 and 2 deal with sequences mainly constructed via characters and analyzed using bounds on character sums. Chapters 3, 5, and 6 deal with polynomials over finite fields. Chapters 4 and 9 consider problems related to coding theory studied via finite geometry and additive combinatorics, respectively. Chapter 7 deals with quasirandom points in view of applications to numerical integration using quasi-Monte Carlo methods and simulation. Chapter 8 studies aspects of iterations of rational functions from which pseudorandom numbers for Monte Carlo methods can be derived. The goal of this book is giving an overview of several recent research directions as well as stimulating research in sequences and polynomials under the unified framework of character theory.

Jean-Paul DELAHAYE. — **Merveilleux nombres premiers: voyage au coeur de l'arithmétique**. — Nouvelle édition. — Bibliothèque scientifique. — Un vol. broché, 18,5 × 24,5 de 294 p. — ISBN 978-2-84245-117-2. — Prix: €28.00. — Belin, Paris, 2012.

Les nombres premiers, ces nombres sans autres facteurs qu'un et eux-mêmes, fascinent: 2, 3, 5, 7, 11, 13... Alors que leur définition semble ne receler aucun mystère, on échoue à trouver une régularité quelconque dans leur succession. Connus dès les débuts de l'arithmétique, les nombres premiers ont excité la curiosité de milliers de mathématiciens. Ils sont au coeur de la science des nombres, car tout entier se décompose de façon unique en un produit de facteurs, premiers. Ils sont aussi à l'origine de certains des problèmes les plus difficiles des mathématiques et ont acquis, avec les progrès de la cryptographie, une importance économique considérable. Dans cet ouvrage, l'auteur mêle éclaircissements théoriques et anecdotes piquantes, afin de restituer toutes les couleurs de l'univers chatoyant des nombres premiers.

Machiel VAN FRANKENHUIJSEN. — **The Riemann hypothesis for function fields**. — London Mathematical Society student texts, vol. 80. — Un vol. broché, 15,5 × 23, de XII, 152 p. — ISBN 978-1-107-68531-4. — Prix: £22.99. — Cambridge University Press, Cambridge, 2014.

This book provides a lucid exposition of the connections between non-commutative geometry and the famous Riemann Hypothesis, focusing on the theory of one-dimensional varieties over a finite field. The reader will encounter many important aspects of the theory, such as Bombieri's proof of the Riemann Hypothesis for function fields, along with an explanation of the connections with Nevanlinna theory and non-commutative geometry. The connection with non-commutative geometry is given special attention, with a complete determination of the Weil terms in the explicit formula for the point counting function as a trace of a shift operator on the additive space, and a discussion of how to obtain the explicit formula from the action of the idele class group on the space of adele classes. The exposition is accessible at the graduate level and above, and provides a wealth of motivation for further research in this area.

David J. GRYNKIEWICZ. — **Structural additive theory**. — Developments in mathematics, vol. 30. — Un vol. relié, 18 × 26, de XII, 426 p. — ISBN 978-3-319-00415-0. — Prix: SFr. 126.50. — Springer, Cham, 2013.

Nestled between number theory, combinatorics, algebra, and analysis lies a rapidly developing subject in mathematics variously known as additive combinatorics, additive number theory, additive group theory, and combinatorial number theory. Its main objects of study are not abelian groups themselves, but rather the additive structure of subsets and subsequences of an abelian group, i.e. sumsets and subsequence sums. This text is a hybrid of a research monograph and an introductory graduate textbook. With few exceptions, all results presented are self-contained, written in great detail, and only reliant upon material covered in an advanced undergraduate curriculum supplemented with some additional algebra, rendering this book usable as an entry-level text. However, it will perhaps be of even more interest to researchers already in the field. The majority of material is not found in book form and includes many new results as well. Even classical results, when included, are given in greater generality or using new proof variations. The text has a particular focus on results of a more exact and precise nature, results with strong hypotheses and yet stronger conclusions, and on fundamental aspects of the theory. Also included are intricate results often neglected in other texts owing to their complexity. Highlights include an extensive treatment of Freiman homomorphisms and the universal ambient group of sumsets $A + B$, an entire chapter devoted to Hamidoune's isoperimetric method, a novel generalization allowing infinite summands in finite sumset questions, weighted zero-sum

problems treated in the general context of viewing homomorphisms as weights, and simplified proofs of the Kemperman structure theorem and the partition theorem for setpartitions.

Géométrie algébrique

Yujiro KAWAMATA, (Editor). — **Derived categories in algebraic geometry : Tokyo 2011**. — Series of congress reports. — Un vol. relié, 17,5 × 24,5, de VIII, 346 p. — ISBN 978-3-03719-115-6. — Prix : SFr. 90.00. — European Mathematical Society, Zürich, 2012.

The study of derived categories is a subject that attracts increasingly many young mathematicians from various fields of mathematics, including abstract algebra, algebraic geometry, representation theory and mathematical physics. The concept of the derived category of sheaves was invented by Grothendieck and Verdier in the 1960s as a tool to express important results in algebraic geometry such as the duality theorem. In the 1970s, Beilinson, Gelfand and Gelfand discovered that a derived category of an algebraic variety may be equivalent to that of a finite dimensional non-commutative algebra, and Mukai found that there are non-isomorphic algebraic varieties that have equivalent derived categories. In this way the derived category provides a new concept that has many incarnations. In the 1990s, Bondal and Orlov uncovered an unexpected parallelism between derived categories and birational geometry. Kontsevich's homological mirror symmetry provided further motivation for the study of derived categories. This book is the proceedings of a conference held at the University of Tokyo in January 2011 on the current status of the research on derived categories related to algebraic geometry. Most articles are survey papers on this rapidly developing field. The book is suitable for young mathematicians who want to enter this exciting field. Some basic knowledge of algebraic geometry is assumed.

Anneaux et algèbres

Aslak BAKKE BUAN, Idun REITEN, Øyvind SOLBERG, (Editors). — **Algebras, quivers and representations : the Abel Symposium 2011**. — Abel symposia, vol. 8. — Un vol. relié, 16 × 24, de XX, 298 p. — ISBN 978-3-642-39484-3. — Prix : SFr. 113.50. — Springer, Berlin, 2013.

This book features survey and research papers from The Abel Symposium 2011, held in Balestrand, Norway 2011. It examines a very active research area that has had a growing influence and profound impact in many other areas of mathematics like commutative algebra, algebraic geometry, algebraic groups and combinatorics. This volume illustrates and extends such connections with algebraic geometry, cluster algebra theory, commutative algebra, dynamical systems and triangulated categories. In addition, it includes contributions on further developments in representation theory of quivers and algebras. *Algebras, Quivers and Representations* is targeted at researchers and graduate students in algebra, representation theory and triangulated categories.

Bhavanari SATYANARAYANA, Kuncham Syam PRASAD. — **Near rings, fuzzy ideals, and graph theory**. — Un vol. relié, 16 × 24, de XI, 468 p. — ISBN 978-1-4398-7310-6. — Prix : US$99.95. — CRC Press, Boca Raton, 2013.

Near Rings, Fuzzy Ideals, and Graph Theory explores the relationship between near rings and fuzzy sets and between near rings and graph theory. It covers topics from recent literature along with several characterizations. After introducing all of the necessary fundamentals of algebraic systems, the book presents the essentials of near rings theory, relevant examples, notations, and simple theorems. It then describes the prime ideal concept in near rings, takes a rigorous approach to the dimension theory of N-groups, gives some detailed proofs of matrix near rings, and discusses the gamma near ring, which is a generalization of both gamma rings and near rings. The authors also provide an introduction to fuzzy algebraic systems, particularly the fuzzy ideals of near rings and gamma near rings. The final chapter explains important concepts in graph theory, including directed hypercubes, dimension, prime graphs, and graphs with respect to ideals in near rings. Near ring theory has many applications in areas as diverse as digital computing, sequential mechanics, automata theory, graph theory, and combinatorics. Suitable for researchers and graduate students, this book

provides readers with an understanding of near ring theory and its connection to fuzzy ideals and graph theory.

Théorie des groupes et généralisations

Daciberg LIMA GONÇALVEZ, John GUASCHI. — **The classification of the virtually cyclic subgroups of the sphere braid groups**. — Springer briefs in mathematics. — Un vol. broché, 15,5 × 23,5, de X, 102 p. — ISBN 978-3-319-00256-9. — Prix : SFr. 67.00. — Springer, Cham, 2013.

This manuscript is devoted to classifying the isomorphism classes of the virtually cyclic subgroups of the braid groups of the 2-sphere. As well as enabling us to understand better the global structure of these groups, it marks an important step in the computation of the K-theory of their group rings. The classification itself is somewhat intricate, due to the rich structure of the finite subgroups of these braid groups, and is achieved by an in-depth analysis of their group-theoretical and topological properties, such as their centralisers, normalisers and cohomological periodicity. Another important aspect of our work is the close relationship of the braid groups with mapping class groups. This manuscript will serve as a reference for the study of braid groups of low-genus surfaces, and is addressed to graduate students and researchers in low-dimensional, geometric and algebraic topology and in algebra.

Groupes topologiques, groupes et algèbres de Lie

Daniel BUMP. — **Lie groups**. — Second edition. — Graduate texts in mathematics. — Un vol. relié, 16 × 24, de XIII, 551 p. — ISBN 978-1-4614-8023-5. — Prix : SFr. 93.50. — Springer, New York, 2013.

This book is intended for a one-year graduate course on Lie groups and Lie algebras. The book goes beyond the representation theory of compact Lie groups, which is the basis of many texts, and provides a carefully chosen range of material to give the student the bigger picture. The book is organized to allow different paths through the material depending on one's interests. This second edition has substantial new material, including improved discussions of underlying principles, streamlining of some proofs, and many results and topics that were not in the first edition. For compact Lie groups, the book covers the Peter-Weyl theorem, Lie algebra, conjugacy of maximal tori, the Weyl group, roots and weights, Weyl character formula, the fundamental group and more. The book continues with the study of complex analytic groups and general noncompact Lie groups, covering the Bruhat decomposition, Coxeter groups, flag varieties, symmetric spaces, Satake diagrams, embeddings of Lie groups and spin. Other topics that are treated are symmetric function theory, the representation theory of the symmetric group, Frobenius-Schur duality and $\mathrm{GL}(n) \times \mathrm{GL}(m)$ duality with many applications including some in random matrix theory, branching rules, Toeplitz determinants, combinatorics of tableaux, Gelfand pairs, Hecke algebras, the "philosophy of cusp forms" and the cohomology of Grassmannians. An appendix introduces the reader to the use of Sage mathematical software for Lie group computations.

Alan HUCKLEBERRY, Ivan PENKOV, Gregg ZUCKERMAN, (Editors). — **Lie groups : structure, actions and representations. In honor of Joseph A. Wolf on the occasion of his 75^{th} birthday**. — Progress in mathematics, vol. 306. — Un vol. relié, 16 × 24,5, de XIV, 413 p. — ISBN 978-1-4614-7192-9. — Prix : €100.21. — Birkhäuser/Springer, New York, 2013.

Lie Groups : Structures, Actions, and Representations, In Honor of Joseph A. Wolf on the Occasion of his 75^{th} Birthday consists of invited expository and research articles on new developments arising from Wolf's profound contributions to mathematics. Due to Professor Wolf's broad interests, outstanding mathematicians and scholars in a wide spectrum of mathematical fields contributed to the volume. Algebraic, geometric, and analytic methods are employed. More precisely, finite groups and classical finite dimensional, as well as infinite-dimensional Lie groups, and algebras play a role. Actions on classical symmetric spaces, and on abstract homogeneous and representation spaces are discussed. Contributions in the area of representation theory involve numerous viewpoints, including that of algebraic groups and various analytic aspects of harmonic analysis.

Christophe ECKES ; avec la collab. d'Amaury THUILLIER. — **Les groupes de Lie dans l'oeuvre de Hermann Weyl**. — Traduction et commentaire de l'article "Théorie de la représentation des groupes continus semi-simples par des transformations linéaires (1925-1926)". — Histoires de géométries. — Un vol. broché, 16 × 24, de XVI, 401 p. — ISBN 978-2-8143-0180-1. — Prix : €20.00. — Presses universitaires de Nancy / Éditions universitaires de Lorraine, Nancy, 2013.

Ce livre contient une traduction inédite de l'article sur les groupes et les algèbres de Lie semi-simples que le mathématicien Hermann Weyl (1885–1955) a publié dans la Mathematische Zeitschrift en 1925–1926. Cet article constitue l'un des principaux jalons dans l'histoire de la théorie des groupes de Lie : Weyl y combine deux méthodes distinctes empruntées à Cartan et Hurwitz. Ce faisant, Weyl démontre le théorème de complète réductibilité (pour toute algèbre de Lie semi-simple) ainsi que la formule des caractères et de la dimension pour tout groupe de Lie semi-simple. Cette traduction est accompagnée d'un commentaire exhaustif portant sur les sources, la structure et la réception de cet article. Il s'agit tout d'abord de savoir comment Weyl s'approprie les travaux respectifs de Cartan, Frobenius, Hurwitz et Schur. Weyl parvient à les synthétiser dans son article qui frappe par sa profonde unité. Cette unité prend la forme d'une harmonie polyphonique entre plusieurs méthodes et domaines des mathématiques. Le texte de Weyl est ensuite étudié à partir d'une problématique contemporaine en histoire des mathématiques portant sur les questions de généralité. L'objectif est alors de montrer, à partir d'une analyse fine d'indices textuels, que le groupe spécial linéaire constitue un exemple paradigmatique dans cet article : l'étude de ce cas permet à Weyl d'accéder à la théorie générale des algèbres de Lie (semi-simples). S'agissant de la réception de cet article, l'auteur revient tout d'abord sur la complexité des échanges entre Cartan et Weyl au sujet des groupes de Lie à partir de 1925. Il rend ensuite compte de la controverse qui oppose Weyl à certains algébristes – Noether, van der Waerden, Artin ou encore Hasse – sur les méthodes de l'algèbre abstraite au début des années 1930. L'auteur aborde enfin le projet de réécriture de cet article inauguré par Weyl dans son cours consacré aux algèbres de Lie à l'Institute for Advanced Study (IAS, Princeton) en 1934–1935. Cette étude est fondée sur des documents inédits conservés dans les archives Weyl à l'ETH de Zürich. Cette réécriture sera prolongée par Jacobson (qui fut le premier assistant de Weyl à Princeton) et Chevalley qui, en 1946, publie la première partie d'une grande monographie sur les groupes de Lie et les groupes algébriques. Ce projet de réécriture ne saurait être décrit indépendamment du cadre institutionnel de l'université de Princeton et de l'IAS.

Fonctions de variables réelles

Harold M. EDWARDS. — **Advanced calculus : a differential forms approach**. — Reprint of the 1994 edition. — Modern Birkhäuser classics. — Un vol. relié, 18 × 25,5, de XIX, 508 p. — ISBN 978-0-8176-8411-2. — Prix : SFr. 93.50. — Birkhäuser/Springer, New York, 2014.

In a book written for mathematicians, teachers of mathematics, and highly motivated students, Harold Edwards has taken a bold and unusual approach to the presentation of advanced calculus. He begins with a lucid discussion of differential forms and quickly moves to the fundamental theorems of calculus and Stokes' theorem. The result is genuine mathematics, both in spirit and content, and an exciting choice for an honors or graduate course or indeed for any mathematician in need of a refreshingly informal and flexible reintroduction to the subject. For all these potential readers, the author has made the approach work in the best tradition of creative mathematics. This affordable softcover reprint of the 1994 edition presents the diverse set of topics from which advanced calculus courses are created in beautiful unifying generalization. The author emphasizes the use of differential forms in linear algebra, implicit differentiation in higher dimensions using the calculus of differential forms, and the method of Lagrange multipliers in a general but easy-to-use formulation. There are copious exercises to help guide the reader in testing understanding. The chapters can be read in almost any order, including beginning with the final chapter that contains some of the more traditional topics of advanced calculus courses. In addition, it is ideal for a course on vector analysis from the differential forms point of view. The professional mathematician will find here a delightful example of mathematical literature ; the student fortunate enough to have gone through this book will have a firm grasp of the nature of modern mathematics and a solid framework to continue to more advanced studies.

Mesure et intégration

Boris MAKAROV, Anatolii PODKORYTOV. — **Real analysis : measures, integrals and applications**. — Translated from the Russian. — Universitext. — Un vol. broché, 15,5 × 23,5, de XIX, 772 p. — ISBN 978-1-4471-5121-0. — Prix : SFr. 93.50. — Springer, London, 2013.

Real Analysis : Measures, Integrals and Applications is devoted to the basics of integration theory and its related topics. The main emphasis is made on the properties of the Lebesgue integral and various applications both classical and those rarely covered in literature. This book provides a detailed introduction to Lebesgue measure and integration as well as the classical results concerning integrals of multivariable functions. It examines the concept of the Hausdorff measure, the properties of the area on smooth and Lipschitz surfaces, the divergence formula, and Laplace's method for finding the asymptotic behavior of integrals. The general theory is then applied to harmonic analysis, geometry, and topology. Preliminaries are provided on probability theory, including the study of the Rademacher functions as a sequence of independent random variables. The book contains more than 600 examples and exercises. The reader who has mastered the first third of the book will be able to study other areas of mathematics that use integration, such as probability theory, statistics, functional analysis, partial probability theory, statistics, functional analysis, partial differential equations and others. *Real Analysis : Measures, Integrals and Applications* is intended for advanced undergraduate and graduate students in mathematics and physics. It assumes that the reader is familiar with basic linear algebra and differential calculus of functions of several variables.

Fonctions d'une variable complexe

Joaquim BRUNA, Julià CUFÍ. — **Complex analysis**. — Translated from the Catalan by Ignacio Monreal. — EMS textbooks in mathematics. — Un vol. relié, 17,5 × 24, de XII, 564 p. — ISBN 978-3-03719-111-8. — Prix : SFr. 70.00. — European Mathematical Society, Zürich, 2013.

The theory of functions of a complex variable is a central theme in mathematical analysis that has links to several branches of mathematics. Understanding the basics of the theory is necessary for anyone who wants to have a general mathematical training or for anyone who wants to use mathematics in applied sciences or technology. The book presents the basic theory of analytic functions of a complex variable and their points of contact with other parts of mathematical analysis. This results in some new approaches to a number of topics when compared to the current literature on the subject. Some issues covered are : a real version of the Cauchy-Goursat theorem, theorems of vector analysis with weak regularity assumptions, an approach to the concept of holomorphic functions of real variables, Green's formula with multiplicities, Cauchy's theorem for locally exact forms, a study in parallel of Poisson's equation and the inhomogeneous Cauchy-Riemann equations, the relationship between Green's function and conformal mapping, the connection between the solution of Poisson's equation and zeros of holomorphic functions, and the Whittaker-Shannon theorem of information theory. The text can be used as a manual for complex variable courses of various levels and as a reference book. The only prerequisites for reading it is a working knowledge of the topology of the plane and the differential calculus for functions of several real variables. A detailed treatment of harmonic functions also makes the book useful as an introduction to potential theory.

Théorie du potentiel

Omar EL-FALLAH, Karim KELLAY, Javad MASHREGHI, Thomas RANSFORD. — **A primer on the Dirichlet space**. — Cambridge tracts in mathematics, vol. 203. — Un vol. relié, 15,5 × 23,5, de XIII, 211 p. — ISBN 978-1-107-04752-5. — Prix : £45.00. — Cambridge University Press, Cambridge, 2014.

The Dirichlet space is one of the three fundamental Hilbert spaces of holomorphic functions on the unit disk. It boasts a rich and beautiful theory, yet at the same time remains a source of challenging open problems and a subject of active mathematical research. This book is the first systematic account of the Dirichlet space, assembling results previously only found in scattered research articles, and improving

upon many of the proofs. Topics treated include: the Douglas and Carleson formulas for the Dirichlet integral, reproducing kernels, boundary behaviour and capacity, zero sets and uniqueness sets, multipliers, interpolation, Carleson measures, composition operators, local Dirichlet spaces, shift-invariant subspaces, and cyclicity. Special features include a self-contained treatment of capacity, including the strong-type inequality. The book will be valuable to researchers in function theory, and with over 100 exercises it is also suitable for self-study by graduate students.

Fonctions de plusieurs variables complexes

Steven G. KRANTZ. — **Geometric analysis of the Bergman Kernel and metric**. — Graduate texts in mathematics. — Un vol. relié, 16×24, de XIII, 292 p. — ISBN 978-1-4614-7923-9. — Prix: SFr. 80.00. — Springer, New York, 2013.

This text provides a masterful and systematic treatment of all the basic analytic and geometric aspects of Bergman's classic theory of the kernel and its invariance properties. These include calculation, invariance properties, boundary asymptotics, and asymptotic expansion of the Bergman kernel and metric. Moreover, it presents a unique compendium of results with applications to function theory, geometry, partial differential equations, and interpretations in the language of functional analysis, with emphasis on the several complex variables context. Several of these topics appear here for the first time in book form. Each chapter includes illustrative examples and a collection of exercises which will be of interest to both graduate students and experienced mathematicians. Graduate students who have taken courses in complex variables and have a basic background in real and functional analysis will find this textbook appealing. Applicable courses for either main or supplementary usage include those in complex variables, several complex variables, complex differential geometry, and partial differential equations. Researchers in complex analysis, harmonic analysis, PDEs, and complex differential geometry will also benefit from the thorough treatment of the many exciting aspects of Bergman's theory.

Équations différentielles ordinaires

Jean-Baptiste HIRIART-URRUTY. — **Les équations différentielles pour les débutants**. — MiniMax. — Un vol. relié, 18,5×25,5, de 157 p. — ISBN 978-2-35141-299-2. — Prix: €19.90. — H&K, Paris, 2013.

Les équations différentielles sont des outils indispensables en physique, chimie, biologie, économie... et en mathématiques. Comme elles ne sont plus enseignées au lycée, ce livre reprend tout à zéro. Il procède par petits pas, qui permettent à tous les étudiants de comprendre avant d'apprendre, en s'appuyant sur des exemples intégrés au fil du texte. Ce cours illustré est le fruit de dizaines d'années d'expérience de l'enseignement à tous les niveaux, aussi bien avant qu'après le bac. L'auteur n'est pas seulement un mathématicien reconnu, il est aussi un pédagogue qui sait se mettre à la portée de tous.

Équations aux dérivées partielles

Bogdan BOJARSKI, Vladimir GUTLYANSKII, Olli MARTIO, Vladimir RYAZANOV. — **Infinitesimal geometry of quasiconformal and bi-Lipschitz mappings in the plane**. — Tracts in mathematics, vol. 19. — Un vol. relié, 17,5×24,5, de IX, 205 p. — ISBN 978-3-03719-122-4. — Prix: €58.00. — European Mathematical Society, Zürich, 2013.

This book is intended for researchers interested in new aspects of local behavior of plane mappings and their applications. The presentation is self-contained, but the reader is assumed to know basic complex and real analysis. The study of the local and boundary behavior of quasiconformal and bi-Lipschitz mappings in the plane forms the core of the book. The concept of the infinitesimal space is used to investigate the behavior of a mapping at points without differentiability. This concept, based on compactness properties, is applied to regularity problems of quasiconformal mappings and quasiconformal curves, boundary behavior, weak

and asymptotic conformality, local winding properties, variation of quasiconformal mappings, and criteria of univalence. Quasiconformal and bi-Lipschitz mappings are instrumental for understanding elasticity, control theory and tomography and the book also offers a new look at the classical areas such as the boundary regularity of a conformal map. Complicated local behavior is illustrated by many examples. The text offers a detailed development of the background for graduate students and researchers. Starting with the classical methods to study quasiconformal mappings, this treatment advances to the concept of the infinitesimal space and then relates it to other regularity properties of mappings in Part II. The new unexpected connections between quasiconformal and bi-Lipschitz mappings are treated in Part III. There is an extensive bibliography.

David COLTON, Rainer KRESS. — **Integral equation methods in scattering theory**. — Classics in applied mathematics, vol. 72. — Un vol. broché, 16×23, de XVI, 271 p. — ISBN 978-1-611973-15-0. — Prix : £61.00. — SIAM, Philadelphia, 2013, distribué par Cambridge University Press.

Scattering theory, a powerful method for the analysis of PDEs, represents one of the most important developments in mathematical physics of recent decades. This classic book is ideal as a supplemental text in a graduate course on scattering theory or inverse problems, and will also be of interest to research scientists in mathematics, physics and engineering. The exposition is based on a rigorous treatment of the Riesz-Fredholm theory of compact operators in dual systems, followed by a derivation of the jump conditions and mapping properties of scalar and vector potentials in spaces of continuous functions. These results are then used to study scattering problems for the Helmholtz and Maxwell equations. The reader will find an in-depth treatment of the use of boundary integral equations to solve scattering problems for acoustic and electromagnetic waves, and an introduction to inverse scattering theory with an emphasis on a function-theoretic approach. Readers will benefit from : A full discussion of the mapping properties of scalar and vector potentials in spaces of continuous functions. – An in-depth treatment of the use of boundary integral equations to solve scattering problems for acoustic and electromagnetic waves. – An introduction to inverse scattering theory with an emphasis on a function-theoretic approach.

Robert DENK, Mario KAIP. — **General parabolic mixed order systems in L_p and applications**. — Operator theory : advances and applications, vol. 239. — Un vol. relié, 16×24, de VIII, 250 p. — ISBN 978-3-319-01999-4. — Prix : SFr. 113.50. — Birkhäuser/Springer, Cham, 2013.

In this text, a theory for general linear parabolic partial differential equations is established, which covers equations with inhomogeneous symbol structure as well as mixed order systems. Typical applications include several variants of the Stokes system and free boundary value problems. We show well-posedness in L_p-L_q-Sobolev spaces in time and space for the linear problems (i.e., maximal regularity), which is the key step for the treatment of nonlinear problems. The theory is based on the concept of the Newton polygon and can cover equations that are not accessible by standard methods as, e.g., semigroup theory. Results are obtained in different types of non-integer L_p-Sobolev spaces as Besov spaces, Bessel potential spaces, and Triebel-Lizorkin spaces. The latter class appears in a natural way as traces of L_p-L_q-Sobolev spaces. We also present a selection of applications in the whole space and on half-spaces. Among others, we prove well-posedness of the linearizations of the generalized thermoelastic plate equation, the two-phase Navier-Stokes equations with Boussinesq-Scriven surface, and the L_p-L_q two-phase Stefan problem with Gibbs-Thomson correction.

Isabelle GALLAGHER, Laure SAINT-RAYMOND, Benjamin TEXIER. — **From Newton to Boltzmann : hard spheres and short-range potentials**. — Zurich lectures in advanced mathematics. — Un vol. broché, 17×24, de XI, 135 p. — ISBN 978-3-03719-129-3. — Prix : €32.00. — European Mathematical Society, Zürich, 2013.

The question addressed in this monograph is the relationship between the time-reversible Newton dynamics for a system of particles interacting via elastic collisions, and the irreversible Boltzmann dynamics which gives a statistical description of the collision mechanism. Two types of elastic collisions are considered : hard spheres, and compactly supported potentials. Following the steps suggested by Lanford in 1974, we describe the transition from Newton to Boltzmann by proving a rigorous convergence result in short time, as the number of particles tends to infinity and their size simultaneously goes to zero, in the Boltzmann-Grad scaling. Boltzmann's kinetic theory rests on the assumption that particle independence is propagated by

the dynamics. This assumption is central to the issue of appearance of irreversibility. For finite numbers of particles, correlations are generated by collisions. The convergence proof establishes that for initially independent configurations, independence is statistically recovered in the limit. This book is intended for mathematicians working in the fields of partial differential equations and mathematical physics, and is accessible to graduate students with a background in analysis.

Systèmes dynamiques et théorie ergodique

Jacques M. BAHI, Christophe GUYEUX. — **Discrete dynamical systems and chaotic machines : theory and applications**. — Chapman & Hall/CRC numerical analysis and scientific computing. — Un vol. relié, 16 × 24, de XVI, 212 p. — ISBN 978-1-4665-5450-4. — Prix : US$89.95. — CRC Press, Boca Raton, 2013.

For computer scientists, especially those in the security field, the use of chaos has been limited to the computation of a small collection of famous but unsuitable maps that offer no explanation of why chaos is relevant in the considered contexts. *Discrete Dynamical Systems and Chaotic Machines : Theory and Applications* shows how to make finite machines, such as computers, neural networks, and wireless sensor networks, work chaotically as defined in a rigorous mathematical framework. Taking into account that these machines must interact in the real world, the authors share their research results on the behaviors of discrete dynamical systems and their use in computer science. Covering both theoretical and practical aspects, the book presents : Key mathematical and physical ideas in chaos theory. — Computer science fundamentals, clearly establishing that chaos properties can be satisfied by finite state machines. — Concrete applications of chaotic machines in computer security, including pseudorandom number generators, hash functions, digital watermarking, and steganography. — Concrete applications of chaotic machines in wireless sensor networks, including secure data aggregation and video surveillance. Until the authors' recent research, the practical implementation of the mathematical theory of chaos on finite machines raised several issues. This self-contained book illustrates how chaos theory enables the study of computer security problems, such as steganalysis, that otherwise could not be tackled. It also explains how the theory reinforces existing cryptographically secure tools and schemes.

Luís BARREIRA. — **Dimension theory of hyperbolic flows**. — Springer monographs in mathematics. — Un vol. relié, 16 × 24, de X, 158 p. — ISBN 978-3-319-00547-8. — Prix : SFr. 113.50. — Springer, Cham, 2013.

The dimension theory of dynamical systems has progressively developed, especially over the last two decades, into an independent and extremely active field of research. Its main aim is to study the complexity of sets and measures that are invariant under the dynamics. In particular, it is essential to characterizing chaotic strange attractors. To date, some parts of the theory have either only been outlined, because they can be reduced to the case of maps, or are too technical for a wider audience. In this respect, the present monograph is intended to provide a comprehensive guide. Moreover, the text is self-contained and with the exception of some basic results in Chapters 3 and 4, all the results in the book include detailed proofs. The book is intended for researchers and graduate students specializing in dynamical systems who wish to have a sufficiently comprehensive view of the theory together with a working knowledge of its main techniques. The discussion of some open problems is also included in the hope that it may lead to further developments. Ideally, readers should have some familiarity with the basic notions and results of ergodic theory and hyperbolic dynamics at the level of an introductory course in the area, though the initial chapters also review all the necessary material.

Kaspar NIPP, Daniel STOFFER. — **Invariant manifolds in discrete and continuous dynamical systems**. — Tracts in mathematics, vol. 21. — Un vol. relié, 17,5 × 24,5, de IX, 216 p. — ISBN 978-3-03719-124-8. — Prix : SFr. 70.00. — European Mathematical Society, Zürich, 2013.

In this book dynamical systems are investigated from a geometric viewpoint. Admitting an invariant manifold is a strong geometric property of a dynamical system. This text presents rigorous results on invariant manifolds and gives examples of possible applications. In the first part discrete dynamical systems

in Banach spaces are considered. Results on the existence and smoothness of attractive and repulsive invariant manifolds are derived. In addition, perturbations and approximations of the manifolds and the foliation of the adjacent space are treated. In the second part analogous results for continuous dynamical systems in finite dimensions are established. In the third part the theory developed is applied to problems in numerical analysis and to singularly perturbed systems of ordinary differential equations. The mathematical approach is based on the so-called graph transform, already used by Hadamard in 1901. The aim is to establish invariant manifold results in a simple setting providing quantitative estimates. The book is targeted at researchers in the field of dynamical systems interested in precise theorems easy to apply. The application part might also serve as an underlying text for a student seminar in mathematics.

Analyse de Fourier, analyse harmonique abstraite

Audrey TERRAS. — **Harmonic analysis on symmetric spaces - Euclidean space, the sphere, and the Poincaré upper half-plane**. — Second edition. — Un vol. relié, 16×24, de XVII, 413 p. — ISBN 978-1-4614-7971-0. — Prix : €63.00. — Springer, New York, 2013.

This unique text is an introduction to harmonic analysis on the simplest symmetric spaces, namely Euclidean space, the sphere, and the Poincaré upper half plane. This book is intended for beginning graduate students in mathematics or researchers in physics or engineering. Written with an informal style, the book places an emphasis on motivation, concrete examples, history, and, above all, applications in mathematics, statistics, physics, and engineering. Many corrections, new topics, and updates have been incorporated in this new edition. These include discussions of the work of P. Sarnak and others making progress on various conjectures on modular forms, the work of T. Sunada, Marie-France Vignéras, Carolyn Gordon, and others on Mark Kac's question "Can you hear the shape of a drum ?", Ramanujan graphs, wavelets, quasicrystals, modular knots, triangle and quaternion groups, computations of Maass waveforms, and, finally, the author's comparisons of continuous theory with the finite analogues. Topics featured throughout the text include inversion formulas for Fourier transforms, central limit theorems, Poisson's summation formula and applications in crystallography and number theory, applications of spherical harmonic analysis to the hydrogen atom, the Radon transform, non-Euclidean geometry on the Poincaré upper half plane $\boldsymbol{H}$ or unit disc and applications to microwave engineering, fundamental domains in $\boldsymbol{H}$ for discrete groups Γ, tessellations of $\boldsymbol{H}$ from such discrete group actions, automorphic forms, the Selberg trace formula and its applications in spectral theory as well as number theory.

Analyse fonctionnelle

M. Scott OSBORNE. — **Locally convex spaces**. — Graduate texts in mathematics. — Un vol. relié, 16×24, de VIII, 213 p. — ISBN 978-3-319-02044-0. — Prix : SFr. 67.00. — Springer, Cham, 2014.

For most practicing analysts who use functional analysis, the restriction to Banach spaces seen in most real analysis graduate texts is not enough for their research. This graduate text, while focusing on locally convex topological vector spaces, is intended to cover most of the general theory needed for application to other areas of analysis. Normed vector spaces, Banach spaces, and Hilbert spaces are all examples of classes of locally convex spaces, which is why this is an important topic in functional analysis. While this graduate text focuses on what is needed for applications, it also shows the beauty of the subject and motivates the reader with exercises of varying difficulty. Key topics covered include point set topology, topological vector spaces, the Hahn-Banach theorem, seminorms and Fréchet spaces, uniform boundedness, and dual spaces. The prerequisite for this text is the Banach space theory typically taught in a beginning graduate real analysis course.

Aukasz PIASECKI. — **Classification of Lipschitz mappings**. — Monographs and textbooks in pure and applied mathematics. — Un vol. relié, 16×24, de X, 224 p. — ISBN 978-1-4665-9521-7. — Prix : US$99.95. — CRC Press, Boca Raton, 2014.

Classification of Lipschitz Mappings presents a systematic, self-contained treatment of a new classification of Lipschitz mappings and its application in many topics of metric fixed point theory. Suitable for

readers interested in metric fixed point theory, differential equations, and dynamical systems, the book only requires a basic background in functional analysis and topology. The author focuses on a more precise classification of Lipschitzian mappings. The mean Lipschitz condition introduced by Goebel, Japón Pineda, and Sims is relatively easy to check and turns out to satisfy several principles: regulating the possible growth of the sequence of Lipschitz constants $k(T^n)$, ensuring good estimates for $k_0(T)$ and $k_\infty(T)$, providing some new results in metric fixed point theory.

Géométrie

Daniel JAQUES, avec la collaboration de Jean-François CALAME. — **Géométrie spatiale: le vade-mecum**. — Un vol. broché, 25×20, de 337 p. — ISBN 978-2-88074-945-3. — Prix: SFr. 55.00. — Presses polytechniques et universitaires romandes, Lausanne, 2013.

De manière inédite, cet ouvrage présente, sous une forme synthétique et didactique, l'ensemble des outils et méthodes de construction de la géométrie spatiale permettant d'élaborer des images d'objets tridimensionnels au moyen des projections géométriques. Très richement illustré et imprimé en couleur, il expose les concepts clés des projections orthogonales, de l'axonométrie et de la perspective, et aborde les surfaces courbes et réglées, les surfaces de révolution ainsi que les polyèdres réguliers. Privilégiant une géométrie spatiale concrète, ancrée dans la pratique professionnelle, ce vade-mecum permet à son lecteur de maîtriser les propriétés fondamentales de la géométrie spatiale, de réaliser manuellement des croquis d'objets spatiaux et de pratiquer avec davantage de compétence les logiciels informatiques 3D actuels. A différents titres, il constitue une référence utile et précieuse pour tous les étudiants et praticiens en architecture, ingénierie, design ou beaux-arts.

Sotirios E. LOURIDAS, Michael Th. RASSIAS; foreword by Michael H. FREEDMAN. — **Problem-solving and selected topics in Euclidean geometry: in the spirit of the Mathematical Olympiads**. — Un vol. relié, 16×24, de X, 235 p. — ISBN 978-1-4614-7272-8. — Prix: €42.19. — Springer, New York, 2013.

Problem-Solving and Selected Topics in Euclidean geometry: In the Spirit of the Mathematical Olympiads contains theorems of particular value for the solution of Olympiad-caliber problems in Euclidean Geometry. Selected geometric problems, which have been given in International Mathematical Olympiads (IMO) or proposed in short lists in IMO, are discussed. Additionally, a number of new problems proposed by leading mathematicians in the subject with their step-by-step solutions are presented. The book teaches mathematical thinking through geometry and provides inspiration for both students and teachers. From the foreword: "… Young people need such texts, grounded in our shared intellectual history and challenging them to excel and create a continuity with the past. Geometry has seemed destined to give way in our modern computerized world to algebra. As with Michael Th. Rassias' previous homonymous book on number theory, it is a pleasure to see the mental discipline of the ancient Greeks so well represented to a youthful audience." Michael H. Freedman (Fields Medal in Mathematics, 1986).

Marjorie SENECHAL, George M. FLECK, Stan SHERER, (Editors). — **Shaping space: exploring polyhedra in nature, art, and the geometrical imagination**. — Un vol. relié, 18×26, de X, 341 p. — ISBN 978-0-387-92713-8. — Prix: SFr. 53.50. — Springer, New York, 2013.

Molecules, galaxies, art galleries, sculptures, viruses, crystals, architecture, and more: *Shaping Space — Exploring Polyhedra in Nature, Art, and the Geometrical Imagination* is an exuberant survey of polyhedra and at the same time a hands-on, mind-boggling introduction to one of the oldest and most fascinating branches of mathematics. Some of the world's leading geometers present a treasury of ideas, history, and culture to make the beauty of polyhedra accessible to students, teachers, polyhedra hobbyists, and professionals such as architects and designers, painters and sculptors, biologists and chemists, crystallographers, physicists and earth scientists, engineers and model builders, mathematicians and computer scientists. The creative chapters by more than 25 authors explore almost every imaginable side of polyhedra. From the beauty of natural forms to the monumental constructions made by man, there is something to fascinate every reader. The book is dedicated to the memory of the legendary geometer H. S. M. Coxeter and the multifaceted design scientist Arthur L. Loeb.

Ensembles convexes et inégalités géométriques

Michael BAAKE, Uwe GRIMM. — **Aperiodic order. Volume 1 : a mathematical invitation**. — Encyclopedia of mathematics and its applications, vol. 149. — Un vol. relié, 16 × 24, de XVI, 531 p. — ISBN 978-0-521-86991-1. — Prix : £75.00. — Cambridge University Press, Cambridge, 2013.

Quasicrystals are non-periodic solids that were discovered in 1982 by Dan Shechtman, Nobel Prize Laureate in Chemistry 2011. The underlying mathematics, known as the theory of aperiodic order, is the subject of this comprehensive multi-volume series. This first volume provides a graduate-level introduction to the many facets of this relatively new area of mathematics. Special attention is given to methods from algebra, discrete geometry and harmonic analysis, while the main focus is on topics motivated by physics and crystallography. In particular, the authors provide a systematic exposition of the mathematical theory of kinematic diffraction. Numerous illustrations and worked-out examples help the reader to bridge the gap between theory and application. The authors also point to more advanced topics to show how the theory interacts with other areas of pure and applied mathematics.

Károly BEZDEK. — **Lectures on sphere arrangements - the discrete geometric side**. — Fields institute monographs, vol. 32. — Un vol. relié, 16 × 24, de XII, 175 p. — ISBN 978-1-4614-8117-1. — Prix : SFr. 113.50. — Springer, New York, 2013.

This monograph gives a short introduction to parts of modern discrete geometry, in addition to leading the reader to the frontiers of geometric research on sphere arrangements. The readership is aimed at advanced undergraduate and early graduate students, as well as interested researchers. It contains 30 open research problems ideal for graduate students and researchers in mathematics and computer science. Additionally, this book may be considered ideal for a one-semester advanced undergraduate or graduate level course. The core of this book is based on three lectures given by the author at the Fields Institute during the thematic program on Discrete Geometry and Applications and contains four basic topics. The first two deal with active areas that have been outstanding from the birth of discrete geometry, namely dense sphere packings and tilings. Sphere packings and tilings have a very strong connection to number theory, coding, groups, and mathematical programming. Extending the tradition of studying packings of spheres is the investigation of the monotonicity of volume under contractions of arbitrary arrangements of spheres. The third major topic can be found under the sections on ball-polyhedra that study the possibility of extending the theory of convex polytopes to the family of intersections of congruent balls. This section of the text is connected in many ways to the above-mentioned major topics as well as to some other important research areas such as that on coverings by planks (with close ties to geometric analysis). The fourth basic topic is discussed under covering balls by cylinders.

Géométrie différentielle

François LABOURIE. — **Lectures on representations of surface groups**. — Zurich lectures in advanced mathematics. — Un vol. broché, 17 × 24, de VII, 138 p. — ISBN 978-3-03719-127-9. — Prix : SFr. 40.00. — European Mathematical Society, Zürich, 2013.

The subject of these notes is the character variety of representations of a surface group in a Lie group. We emphasize the various points of view (combinatorial, differential, algebraic) and are interested in the description of its smooth points, symplectic structure, volume and connected components. We also show how a three manifold bounded by the surface leaves a trace in this character variety. These notes were originally designed for students with only elementary knowledge of differential geometry and topology. In the first chapters, we do not insist in the details of the differential geometric constructions and refer to classical textbooks, while in the more advanced chapters proofs occasionally are provided only for special cases where they convey the flavor of the general arguments. These notes could also be used by researchers entering this fast expanding field as motivation for further studies proposed in a concluding paragraph of every chapter.

Topologie algébrique

Phillip Griffiths, John Morgan. — **Rational homotopy theory and differential forms**. — Second edition. — Progress in mathematics, vol. 16. — Un vol. relié, 16 × 24, de XI, 224 p. — ISBN 978-1-4614-8467-7. — Prix : SFr. 113.50. — Birkhäuser/Springer, New York, 2013.

This completely revised and corrected version of the well-known Florence notes circulated by the authors together with E. Friedlander examines basic topology, emphasizing homotopy theory. Included is a discussion of Postnikov towers and rational homotopy theory. This is then followed by an in-depth look at differential forms and de Rham's theorem on simplicial complexes. In addition, Sullivan's results on computing the rational homotopy type from forms is presented. New to the Second Edition : Fully-revised appendices including an expanded discussion of the Hirsch lemma. – Presentation of a natural proof of a Serre spectral sequence result. – Updated content throughout the book, reflecting advances in the area of homotopy theory. With its modern approach and timely revisions, this second edition of *Rational Homotopy Theory and Differential Forms* will be a valuable resource for graduate students and researchers in algebraic topology, differential forms, and homotopy theory.

Askold Khovanskii. — **Galois theory, coverings, and Riemann surfaces**. — Un vol. relié, 16 × 24, de VIII, 81 p. — ISBN 978-3-642-38840-8. — Prix : SFr. 53.50. — Springer, Berlin, 2013.

The first part of this book provides an elementary and self-contained exposition of classical Galois theory and its applications to questions of solvability of algebraic equations in explicit form. The second part describes a surprising analogy between the fundamental theorem of Galois theory and the classification of coverings over a topological space. The third part contains a geometric description of finite algebraic extensions of the field of meromorphic functions on a Riemann surface and provides an introduction to the topological Galois theory developed by the author. All results are presented in the same elementary and self-contained manner as classical Galois theory, making this book both useful and interesting to readers with a variety of backgrounds in mathematics, from advanced undergraduate students to researchers.

Tej Bahadur Singh. — **Elements of topology**. — Un vol. relié, 16 × 24, de XXI, 530 p. — ISBN 978-1-4398-7195-9. — Prix : US$99.95. — CRC Press, Boca Raton, 2013.

Topology is a large subject with many branches broadly categorized as algebraic topology, point-set topology, and geometric topology. Point-set topology is the main language for a broad variety of mathematical disciplines. Algebraic topology serves as a powerful tool for studying the problems in geometry and numerous other areas of mathematics. *Elements of Topology* provides a basic introduction to point-set topology and algebraic topology. It is intended for advanced undergraduate and beginning graduate students with working knowledge of analysis and algebra. Topics discussed include the theory of convergence, function spaces, topological transformation groups, fundamental groups, and covering spaces. The author makes the subject accessible by providing more than 250 worked examples and counterexamples with applications. The text also includes numerous end-of-section exercises to put the material into context.

Topologie des variétés, analyse globale et analyse des variétés

Vincent Blanloeil, Totu Ohmoto, (Editors). — **Singularities in geometry and topology. Strasbourg 2009**. — IRMA lectures in mathematics and theoretical physics, vol. 20. — Un vol. broché, 17 × 24, de VIII, 362 p. — ISBN 978-3-03719-118-7. — Prix : €48.00. — European Mathematical Society, Zürich, 2012.

This volume arises from 5th Franco-Japanese Symposium on Singularities, held in Strasbourg in August 2009. The conference brought together an international group of researchers working on singularities in algebraic geometry, analytic geometry and topology, mainly from France and Japan. Besides, it also organized a special session, JSPS Forum on Singularities and Applications, which was aimed to introduce some recent applications of singularity theory to physics and statistics. This book comprises research papers and short lecture notes on advanced topics on singularities. Some surveys on applications that were presented in the Forum are also added. Topics covered include splice surface singularities, b-functions,

equisingularity, degenerating families of Riemann surfaces, hyperplane arrangements, mixed singularities, jet schemes, noncommutative blow-ups, characteristic classes of singular spaces, and applications to geometric optics, cosmology and learning theory. Graduate students who wish to learn about various approaches to singularities, as well as experts in the field and researchers in other areas of mathematics and science will find the contributions to this volume a rich source for further study and research.

Probabilités et processus stochastiques

Yasushi Ishikawa. — **Stochastic calculus of variations for jump processes**. — De Gruyter studies in mathematics, vol. 54. — Un vol. relié, 17,5 × 24,5, de VIII, 266 p. — ISBN 978-3-11-028180-4. — Prix : €89.95. — De Gruyter, Berlin, 2013.

This monograph is a concise introduction to the stochastic calculus of variations (also known as Malliavin calculus) for processes with jumps. It is written for researchers and graduate students who are interested in Malliavin calculus for jump processes. In this book processes "with jumps" includes both pure jump processes and jump-diffusions. The author provides many results on this topic in a self-contained way ; this also applies to stochastic differential equations (SDEs) "with jumps". The book also contains some applications of the stochastic calculus for processes with jumps to the control theory and mathematical finance. Namely, asymptotic expansions functionals related with financial assets of jump-diffusion are provided based on the theory of asymptotic expansion on the Wiener-Poisson space. Solving the Hamilton-Jacobi-Bellman (HJB) equation of integro-differential type is related with solving the classical Merton problem and the Ramsey theory. The field of jump processes is nowadays quite wide-ranging, from the Lévy processes to SDEs with jumps. Recent developments in stochastic analysis have enabled us to express various results in a compact form. Up to now, these topics were rarely discussed in a monograph.

Ming Liao. — **Applied stochastic processes**. — Un vol. relié, 16 × 24, de VIII, 199 p. — ISBN 978-1-4665-8933-9. — Prix : US$79.95. — CRC Press, Boca Raton, 2014.

Applied Stochastic Processes presents a concise, graduate-level treatment of the subject, emphasizing applications and practical computation. It also establishes the complete mathematical theory in an accessible way. After reviewing basic probability, the text covers Poisson processes, renewal processes, discrete- and continuous-time Markov chains, and Brownian motion. It also offers an introduction to stochastic differential equations. While the main applications described are queues, the book also considers other examples, such as the mathematical model of a single stock market. With exercises in most sections, this book provides a clear, practical introduction for beginning graduate students. The material is presented in a straightforward manner using short, motivating examples. In addition, the author develops the mathematical theory with a strong emphasis on probability intuition.

Christian Mazza, Michel Benaïm. — **Stochastic dynamics for systems biology**. — Chapman & Hall/CRC mathematical and computational biology series. — Un vol. relié, 15,5 × 23,5, de XII, 260 p. — ISBN 978-1-4665-1493-5. — Prix : US$79.95. — CRC Press, Boca Raton, 2014.

Stochastic Dynamics for Systems Biology is one of the first books to provide a systematic study of the many stochastic models used in systems biology. The book shows how the mathematical models are used as technical tools for simulating biological processes and how the models lead to conceptual insights on the functioning of the cellular processing system. Most of the text should be accessible to scientists with basic knowledge in calculus and probability theory. The authors illustrate the relevant Markov chain theory using realistic models from systems biology, including signaling and metabolic pathways, phosphorylation processes, genetic switches, and transcription. A central part of the book presents an original and up-to-date treatment of cooperativity. The book defines classical indexes, such as the Hill coefficient, using notions from statistical mechanics. It explains why binding curves often have S-shapes and why cooperative behaviors can lead to ultrasensitive genetic switches. These notions are then used to model transcription rates. Examples cover the phage lambda genetic switch and eukaryotic gene expression. The book then presents a short course on dynamical systems and describes stochastic aspects of linear noise approximation. This mathematical framework enables the simplification of complex stochastic dynamics using Gaussian

processes and nonlinear ODEs. Simple examples illustrate the technique in noise propagation in gene networks and the effects of network structures on multistability and gene expression noise levels. The last chapter provides up-to-date results on stochastic and deterministic mass action kinetics with applications to enzymatic biochemical reactions and metabolic pathways.

Charles-Edouard PFISTER. — **Théorie des probabilités : cours d'introduction avec application à la statistique mathématique**. — Enseignement des mathématiques. — Un vol. broché, 16 × 24, de XVII, 229 p. — ISBN 978-2-88074-981-1. — Prix : SFr. 45.00. — Presses polytechniques et universitaires romandes, Lausanne, 2012.

Cet ouvrage constitue une première introduction à la théorie des probabilités. A la fois rigoureux et didactique, il présente l'ensemble des notions et outils de base, et de manière approfondie, les deux théorèmes fondamentaux que sont la loi des grands nombres et le théorème de la limite centrale. Certains sujets, comme celui de l'espérance d'une variable aléatoire, sont traités plus en détail qu'usuellement dans un texte d'introduction. La théorie ainsi développée est appliquée d'une part à l'étude des chaînes de Markov, marches aléatoires et au modèle d'Ising, et d'autre part à des sujets classiques de statistique mathématique, estimations, tests, populations normalement distribuées. Les résultats sont démontrés dans leur intégralité, et de nombreux exemples jalonnent le texte. Cette référence s'adresse principalement aux étudiants de physique ou de mathématiques des universités et grandes écoles, maîtrisant au préalable les bases du calcul différentiel et intégral.

Statistique

François HUSSON, Jérôme PAGES. — **Statistiques générales pour utilisateurs : 2 – Exercices et corrigés**. — Deuxième édition augmentée. — Pratique de la statistique. — Un vol. broché, 15,5 × 24, de XI, 364 p. — ISBN 978-2-7535-2830-7. — Prix : €20.00. — Presses Universitaires de Rennes, Rennes, 2013.

Fruit de la grande expérience d'enseignement des auteurs à Agrocampus Ouest, cet ouvrage d'exercices corrigés complète le livre *Statistique générale pour utilisateurs. 1 – Méthodologie*. Cet ensemble d'exercices corrigés de façon détaillée, dont la grande majorité correspond à des applications réelles, permet de s'approprier les principales méthodes statistiques utiles aux praticiens : statistique descriptive, estimation, tests de comparaison de moyennes et de variances, analyse de variance, régression simple et multiple, test du chi-2, plans d'expérience, analyse en composantes principales. Ce livre a été d'abord écrit pour les étudiants d'école d'ingénieurs, d'IUT ou BTS ou de l'université dans les filières des sciences de la vie, sciences sociales, sciences économiques, etc. Mais il sera utile à tout professionnel confronté à l'analyse statistique de données. La mise à disposition, sur le site d'Agrocampus, de l'ensemble des jeux de données et des lignes de code en R permet de reproduire aisément tous les résultats.

Analyse numérique

Raphael COUTURIER, (Editor). — **Designing scientific applications on GPUs**. — Chapman & Hall/CRC numerical analysis and scientific computing. — Un vol. relié, 16 × 24, de XXI, 476 p. — ISBN 978-1-4665-7162-4. — Prix : US$89.95. — CRC Press, Boca Raton, 2014.

Many of today's complex scientific applications now require a vast amount of computational power. General purpose graphics processing units (GPGPUs) enable researchers in a variety of fields to benefit from the computational power of all the cores available inside graphics cards. *Designing Scientific Applications on GPUs* shows you how to use GPUs for applications in diverse scientific fields, from physics and mathematics to computer science. The book explains the methods necessary for designing or porting your scientific application on GPUs. It will improve your knowledge about image processing, numerical applications, methodology to design efficient applications, optimization methods, and much more. The first part of the book introduces the GPUs and Nvidia's CUDA programming model, currently the most widespread environment for designing GPU applications. The second part focuses on significant image

processing applications on GPUs. The third part presents general methodologies for software development on GPUs and the fourth part describes the use of GPUs for addressing several optimization problems. The fifth part covers many numerical applications, including obstacle problems, fluid simulation, and atomic physics models. The last part illustrates agent-based simulations, pseudorandom number generation, and the solution of large sparse linear systems for integer factorization. Some of the codes presented in the book are available online.

Arieh ISERLES, (Editor). — **Acta numerica 2013**. — Un vol. relié, 18×25,5, de 575 p. — ISBN 978-1-107-04386-2. — Prix : £93.00. — Cambridge University Press, Cambridge, 2013.

Acta Numerica is an annual publication containing invited survey papers by leading researchers in numerical mathematics and scientific computing. The papers present overviews of recent developments in their area and provide state-of-the-art techniques and analysis.

Informatique

Alain CARMASOL. — **Mathématiques pour les sciences de l'ingénieur avec Mathematica® . Tome 1**. — Un vol. broché, 17×24, de XII, 581 p. — ISBN 978-2-36493-071-1. — Prix : SFr. 52.70. — Toulouse, Cépaduès, 2013.

Le premier tome de cet ouvrage traite des notions de mathématiques de base nécessaires à un étudiant des filières scientifiques. Il s'agit avant tout d'un cours de mathématiques traité avec toute la rigueur requise. L'ouvrage s'appuie largement sur l'utilisation du logiciel Wolfram Mathematica®, aussi bien dans le déroulement des chapitres de cours qu'au travers de nombreux exemples et exercices. Cela permet de s'affranchir de développements calculatoires sans intérêt, mais aussi d'illustrer, comprendre, appliquer, approfondir les notions du cours. C'est un cours complet de mathématiques, avec de nombreux exemples d'utilisation du logiciel Mathematica, contenant plus d'une centaine d'exercices corrigés.

San LING, Huaxiong WANG, Chaoping XING. — **Algebraic curves in cryptography**. — Discrete mathematics and its applications. — Un vol. relié, 16×24, de XVII, 321 p. — ISBN 978-1-4200-7946-3. — Prix : US$79.95. — CRC Press, Boca Raton, 2013.

The reach of algebraic curves in cryptography goes far beyond elliptic curve or public key cryptography yet these other application areas have not been systematically covered in the literature. Addressing this gap, *Algebraic Curves in Cryptography* explores the rich uses of algebraic curves in a range of cryptographic applications, such as secret sharing, frameproof codes, and broadcast encryption. Suitable for researchers and graduate students in mathematics and computer science, this self-contained book is one of the first to focus on many topics in cryptography involving algebraic curves. After supplying the necessary background on algebraic curves, the authors discuss error-correcting codes, including algebraic geometry codes, and provide an introduction to elliptic curves. Each chapter in the remainder of the book deals with a selected topic in cryptography (other than elliptic curve cryptography). The topics covered include secret sharing schemes, authentication codes, frameproof codes, key distribution schemes, broadcast encryption, and sequences. Chapters begin with introductory material before featuring the application of algebraic curves.

Mécanique des fluides, acoustique

Anvarbek MEIRMANOV. — **Mathematical models for poroelastic flows**. — Atlantis studies in differential equations, vol. 1. — Un vol. relié, 16×24, de XXXVIII, 449 p. — ISBN 978-94-6239-014-0. — Prix : SFr. 126.50. — Atlantis Press, Paris, 2014. Distribué par Springer.

The book is devoted to rigorous derivation of macroscopic mathematical models as a homogenization of exact mathematical models at the microscopic level. The idea is quite natural : one first must describe the joint motion of the elastic skeleton and the fluid in pores at the microscopic level by means of classical continuum mechanics, and then use homogenization to find appropriate approximation models (homogenized

equations). The Navier-Stokes equations still hold at this scale of the pore size in the order of 5 – 15 microns. Thus, as we have mentioned above, the macroscopic mathematical models obtained are still within the limits of physical applicability. These mathematical models describe different physical processes of liquid filtration and acoustics in poroelastic media, such as isothermal or non-isothermal filtration, hydraulic shock, isothermal or non-isothermal acoustics, diffusion-convection, filtration and acoustics in composite media or in porous fractured reservoirs. Our research is based upon the Nguetseng two-scale convergent method.

Mécanique quantique

J.M. Borwein, M.L. Glasser, R.C. Mcphedran, J.G. Wan, I.J. Zucker. — **Lattice sums then and now**. — Encyclopedia of mathematics and its applications, vol. 150. — Un vol. relié, 16 × 24, de XIX, 368 p. — ISBN 978-1-107-03990-2. — Prix : £75.00. — Cambridge University Press, Cambridge, 2013.

The study of lattice sums began when early investigators wanted to go from mechanical properties of crystals to the properties of the atoms and ions from which they were built (the literature of Madelung's constant). A parallel literature was built around the optical properties of regular lattices of atoms (initiated by Lord Rayleigh, Lorentz and Lorenz). For over a century many famous scientists and mathematicians have delved into the properties of lattices, sometimes unwittingly duplicating the work of their predecessors. Here, at last, is a comprehensive overview of the substantial body of knowledge that exists on lattice sums and their applications. The authors also provide commentaries on open questions, and explain modern techniques which simplify the task of finding new results in this fascinating and ongoing field. Lattice sums in one, two, three, four and higher dimensions are covered.

Michael V. Sadovskii. — **Quantum field theory**. — De Gruyter studies in mathematical physics, vol. 17. — Un vol. relié, 17,5 × 24,5, de X, 409 p. — ISBN 978-3-11-027029-7. — Prix : €119.95. — De Gruyter, Berlin, 2013.

This book discusses the main concepts of the standard model of elementary particles in a compact and straightforward way. The work illustrates the unity of modern theoretical physics by combining approaches and concepts of the quantum field theory and modern condensed matter theory. The inductive approach allows a deep understanding of ideas and methods used for solving problems in this field.

Économie, recherche opérationnelle, jeux

Julien Guyon, Pierre Henry-Labordere. — **Nonlinear option pricing**. — Chapman & Hall/CRC financial mathematics series. — Un vol. relié, 16 × 24, de XXXVIII, 445 p. — ISBN 978-1-4665-7033-7. — Prix : US$79.95. — CRC Press, Boca Raton, 2014.

For nonlinear PDEs encountered in quantitative finance, advanced probabilistic methods are needed to address dimensionality issues. Written by two leaders in quantitative research – including Risk magazine's 2013 Quant of the Year – *Nonlinear Option Pricing* compares various numerical methods for solving high-dimensional nonlinear problems arising in option pricing. Designed for practitioners, it is the first authored book to discuss nonlinear Black-Scholes PDEs and compare the efficiency of many different methods. The book helps quants develop both their analytical and numerical expertise. It focuses on general mathematical tools rather than specific financial questions so that readers can easily use the tools to solve their own nonlinear problems. The authors build intuition through numerous real-world examples of numerical implementation. Although the focus is on ideas and numerical examples, the authors introduce relevant mathematical notions and important results and proofs. The book also covers several original approaches, including regression methods and dual methods for pricing chooser options, Monte Carlo approaches for pricing in the uncertain volatility model and the uncertain lapse and mortality model, the Markovian projection method and the particle method for calibrating local stochastic volatility models to market prices of vanilla options with/without stochastic interest rates, the $a + b\lambda$ technique for building local correlation models that calibrate to market prices of vanilla options on a basket, and a new stochastic representation of nonlinear PDE solutions based on marked branching diffusions.

Thierry RONCALLI. — **Introduction to risk parity and budgeting**. — Chapman & Hall/CRC financial mathematics series. — Un vol. relié, 16×24, de XXIII, 410 p. — ISBN 978-1-4822-0715-6. — Prix : US$79.95. — CRC Press, Boca Raton, 2014.

Although portfolio management didn't change much during the 40 years after the seminal works of Markowitz and Sharpe, the development of risk budgeting techniques marked an important milestone in the deepening of the relationship between risk and asset management. Risk parity then became a popular financial model of investment after the global financial crisis in 2008. Today, pension funds and institutional investors are using this approach in the development of smart indexing and the redefinition of long-term investment policies. Written by a well-known expert of asset management and risk parity, *Introduction to Risk Parity and Budgeting* provides an up-to-date treatment of this alternative method to Markowitz optimization. It builds financial exposure to equities and commodities, considers credit risk in the management of bond portfolios, and designs long-term investment policy. The first part of the book gives a theoretical account of portfolio optimization and risk parity. The author discusses modern portfolio theory and offers a comprehensive guide to risk budgeting. Each chapter in the second part presents an application of risk parity to a specific asset class. The text covers risk-based equity indexation (also called smart beta) and shows how to use risk budgeting techniques to manage bond portfolios. It also explores alternative investments, such as commodities and hedge funds, and applies risk parity techniques to multi-asset classes. The book's first appendix provides technical materials on optimization problems, copula functions, and dynamic asset allocation. The second appendix contains 30 tutorial exercises. Solutions to the exercises, slides for instructors, and Gauss computer programs to reproduce the book's examples, tables, and figures are available on the author's website.

Erik SCHLÖGL. — **Quantitative finance : an object-oriented approach in C++**. — Chapman & Hall/CRC financial mathematics series. — Un vol. relié, 16×24, de XV, 338 p. — ISBN 978-1-58488-479-8. — Prix : US$79.95. — CRC Press, Boca Raton, 2014.

Quantitative Finance : An Object-Oriented Approach in C++ provides readers with a foundation in the key methods and models of quantitative finance. Keeping the material as self-contained as possible, the author introduces computational finance with a focus on practical implementation in C++. Through an approach based on C++ classes and templates, the text highlights the basic principles common to various methods and models while the algorithmic implementation guides readers to a more thorough, hands-on understanding. By moving beyond a purely theoretical treatment to the actual implementation of the models using C++, readers greatly enhance their career opportunities in the field. The book also helps readers implement models in a trading or research environment. It presents recipes and extensible code building blocks for some of the most widespread methods in risk management and option pricing. The author's website provides fully functional C++ code, including additional C++ source files and examples. Although the code is used to illustrate concepts (not as a finished software product), it nevertheless compiles, runs, and deals with full, rather than toy, problems. The website also includes a suite of practical exercises for each chapter covering a range of difficulty levels and problem complexity.

Gwo-Hshiung TZENG, Jih-Jeng HUANG. — **Fuzzy multiple objective decision making**. — Un vol. relié, 16×24, de XIV, 308 p. — ISBN 978-1-4665-5461-0. — Prix : US$129.95. — CRC Press, Boca Raton, 2014.

Multi-objective programming (MOP) can simultaneously optimize multi-objectives in mathematical programming models, but the optimization of multi-objectives triggers the issue of Pareto solutions and complicates the derived answers. To address these problems, researchers often incorporate the concepts of fuzzy sets and evolutionary algorithms into MOP models. Focusing on the methodologies and applications of this field, *Fuzzy Multiple Objective Decision Making* presents mathematical tools for complex decision making. The first part of the book introduces the most popular methods used to calculate the solution of MOP in the field of multiple objective decision making (MODM). The authors describe multi-objective evolutionary algorithms ; expand de novo programming to changeable spaces, such as decision and objective spaces ; and cover network data envelopment analysis. The second part focuses on various applications, giving readers a practical, in-depth understanding of MODM. A follow-up to the authors' *Multiple Attribute Decision Making : Methods and Applications*, this book guides practitioners in using MODM methods to

make effective decisions. It also extends students' knowledge of the methods and provides researchers with the foundation to publish papers in operations research and management science journals.

Systèmes, contrôle

Sergiy BUTENKO, Panos M. PARDALOS. — **Numerical methods and optimization : an introduction**. — Un vol. relié, 16,5 × 24, de XVI, 397 p. — ISBN 978-1-4665-7777-0. — Prix : US$79.95. — CRC Press, Boca Raton, 2014.

For students in industrial and systems engineering (ISE) and operations research (OR) to understand optimization at an advanced level, they must first grasp the analysis of algorithms, computational complexity, and other concepts and modern developments in numerical methods. Satisfying this prerequisite, *Numerical Methods and Optimization : An Introduction* combines the materials from introductory numerical methods and introductory optimization courses into a single text. This classroom-tested approach enriches a standard numerical methods syllabus with optional chapters on numerical optimization and provides a valuable numerical methods background for students taking an introductory or optimization course. The first part of the text introduces the necessary mathematical background, the digital representation of numbers, and different types of errors associated with numerical methods. The second part explains how to solve typical problems using numerical methods. Focusing on optimization methods, the final part presents basic theory and algorithms for linear and nonlinear optimization. The book assumes minimal prior knowledge of the topics. Taking a rigorous yet accessible approach to the material, it includes some mathematical proofs as samples of rigorous analysis but in most cases, uses only examples to illustrate the concepts. While the authors provide a MATLAB® guide and code available for download, the book can be used with other software packages.

Information, communication, circuits

Mark KELBERT, Yuri SUHOV. — **Information theory and coding by example**. — Un vol. broché, 17,5 × 24,5, de XI, 514 p. — ISBN 978-0-521-13988-5. — Prix : £35.00. — Cambridge University Press, Cambridge, 2013.

This fundamental monograph introduces both the probabilistic and algebraic aspects of information theory and coding. It has evolved from the authors' years of experience teaching at the undergraduate level, including several Cambridge Maths Tripos courses. The book provides relevant background material, a wide range of worked examples and clear solutions to problems from real exam papers. It is a valuable teaching aid for undergraduate and graduate students, or for researchers and engineers who want to grasp the basic principles.