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## Bulletin bibliographique

### Généralités

Sir Michael ATIYAH, Daniel IAGOLNITZER, Chitao CHONG, (Editors). — **Fields Medallists' Lectures: third edition.** — World scientific series in 21st century mathematics, vol. 1. — Un vol. broché, 16,5×25, de XIX, 1095 p. — ISBN 978-981-4696-18-0. — Prix: £38.00. — World Scientific, New Jersey, 2016.

Although the Fields Medal does not have the same public recognition as the Nobel Prizes, they share a similar intellectual standing. It is restricted to one field — that of mathematics. The medal is awarded to the best mathematicians who are 40 or younger, every four years. A list of Fields Medallists and their contributions provides a bird's-eye view of the major developments in mathematics over the past 80 years. It highlights the areas in which, at various times, the greatest progress has been made. The third edition of *Fields Medallists' Lectures* features additional contributions from: John W. Milnor (1962), Enrico Bombieri (1974), Gerd Faltings (1986), Andrei Okounkov (2006), Terence Tao (2006), Cédric Villani (2010), Elon Lindenstrauss (2010), Ngô Bao Châu (2010), Stanislav Smirnov (2010).

Claude P. BRUTER, (Editor). — **Visual art and diffusion of mathematics: proceedings of the Second ESMA Conference Cagliari, September 18–20 2013.** — Mathematics and art, vol. 3. — Un vol. broché, 16×23,5, de 170 p. — ISBN 978-2-84225-188-8. — Prix: €25.00. — Cassini, [s.l.], 2015.

The deepening of mutual relations between mathematics and the arts today knows a new development, more and more appreciated both by artists and scientists, mathematicians in particular. This volume, the proceedings of the Cagliari Conference organized by the European Society for Mathematics and the Arts (ESMA) in 2013, is the third of a series of books devoted to the links between mathematics and art. The proceedings of the Conference on the subject held in Maubeuge in 2000, and in Paris in 2010 were presented in the first two books. Mathematical tools and software for the creation of artistic scientific visualizations, analysis of artistic works from the mathematical point of view, pedagogical uses of scientific artistic work were the three main themes of the Conference. The reader will discover the important role that mathematical models have played in the pedagogy of mathematics since the nineteenth century, why and how modern artistic mathematical works are an efficient tool for a penetrating initiation into mathematics, which can be adapted to all audiences. In this spirit, the reader will find several artistic creations from a few classical mathematical objects, and quite new visualizations as well using Minkowski's device. A broad theory of cones also appears in the volume. It could be developed by mathematicians or by artists to create new works.

Jacques DUPARC. — **La logique pas à pas.** — Un vol. broché, 17,5×24,5, de 570 p. — ISBN 978-2-88915-126-4. — Prix: SFr. 67.50. — Presses polytechniques et universitaires romandes, Lausanne, 2015.

Mettre les bases de la logique à la portée de tous, et plus particulièrement des non-mathématiciens, tel est l'objectif de ce manuel. Tout spécifiquement conçu pour les étudiants entretenant une relation conflictuelle avec les sciences, ou définitivement rétifs aux maths et au formalisme, il ne requiert aucune formation ou bagage préalable. Pas question cependant de maintenir le lecteur à distance, et de ne lui proposer que quelques aperçus lointains: c'est au contraire au cœur même de la matière que Jacques Duparc emmène

celui-ci, en le guidant pas à pas sur une trace moderne et novatrice, privilégiant le jeu et l'intuitivité. Claire et didactique, une référence incontournable pour l'apprentissage de la logique.

Hans-Heinrich KORLE. — **Infinite series in a history of analysis : stages up to the verge of summability.** — De Gruyter textbook. — Un vol. broché, 17,5×24,5, de 132 p. — ISBN 978-3-11-034372-4. — Prix: €27.00. — De Gruyter, Berlin, 2015.

“Higher mathematic” once pointed towards the involvement of infinity. This we label analysis. The ancient Greeks had helped it to a first high point when they mastered the infinite. The book traces the history of analysis along the risky route of serial procedures through antiquity. It took quite long for this type of mathematics to revive in our region. When and where it did, infinite series proved the driving force. Not until a good two millennia had gone by, would analysis head towards Greek rigor again. To follow all that trial, error and final accomplishment, is more than studying history: it provides touching, worthwhile access to advanced calculus. Moreover, some steps beyond convergence show our subject to naturally fit a wider frame: an overall theory of infinite series.

## *Logique et fondements*

Daniel LASCAR. — **La théorie des modèles en peu de maux .** — Nouvelle bibliothèque mathématique. — Un vol. relié, 16×23,5, de XXIV, 343 p. — ISBN 978-2-84225-137-6. — Prix: €40.00. — Cassini, Paris, 2009.

La théorie des modèles est un puissant outil pour l'étude générale des structures algébriques. Cette algèbre universelle connaît actuellement un développement spectaculaire et intéresse de plus en plus de mathématiciens. La logique mathématique, à laquelle la théorie des modèles se rattache, lui fournit un outil indispensable : les formules du premier ordre. Celles-ci sont définies au premier chapitre, puis constamment utilisées tout au long du livre, mais aucune connaissance préalable en logique n'est nécessaire. On suppose néanmoins que le lecteur a une bonne familiarité avec les structures mathématiques classiques (nombres réels et complexes, groupes, corps ...). Le livre s'adresse aux étudiants de master et de doctorat ainsi qu'aux mathématiciens professionnels. Il a l'ambition de donner à tous un nouvel éclairage sur l'univers mathématique auquel ils sont habitués.

Jeffrey PARIS, Alena VENCOVSKA. — **Pure inductive logic.** — Perspectives in logic. — Un vol. relié, 16×24, de 342 p. — ISBN 978-1-107-04230-8. — Prix: £79.99. — Cambridge University Press, Cambridge, 2015.

Pure inductive logic is the study of rational probability treated as a branch of mathematical logic. This monograph, the first devoted to this approach, brings together the key results from the past seventy years plus the main contributions of the authors and their collaborators over the last decade to present a comprehensive account of the discipline within a single unified context. The exposition is structured around the traditional bases of rationality, such as avoiding Dutch Books, respecting symmetry and ignoring irrelevant information. The authors uncover further rationality concepts, both in the unary and in the newly emerging polyadic languages, such as conformity, spectrum exchangeability, similarity and language invariance. For logicians with a mathematical grounding, this book provides a complete self-contained course on the subject, taking the reader from the basics up to the most recent developments. It is also a useful reference for a wider audience from philosophy and computer science.

## *Analyse combinatoire*

Simeon BALL. — **Finite geometry and combinatorial applications.** — London Mathematical Society student texts, vol. 82. — Un vol. broché, 15,5×23, de XII, 285 p. — ISBN 978-1-107-51843-8. — Prix: £79.99. — Cambridge University Press, Cambridge, 2015.

The projective and polar geometries that arise from a vector space over a finite field are particularly useful in the construction of combinatorial objects, such as latin squares, designs, codes and graphs. This book provides an introduction to these geometries and their many applications to other areas of combinatorics. Coverage includes a detailed treatment of the forbidden subgraph problem from a geometrical point of view, and a chapter on maximum distance separable codes, which includes a proof that such codes over prime fields are short. The author also provides more than 100 exercises (complete with detailed solutions), which show the diversity of applications of finite fields and their geometries. *Finite geometry and combinatorial applications* is ideal for anyone, from a third-year undergraduate to a researcher, who wishes to familiarise themselves with and gain an appreciation of finite geometry.

Alan FRIEZE, Michał KARONSKI. — **Introduction to random graphs**. — Un vol. relié, 17,5×24,5, de XI, 464 p. — ISBN 978-1-107-11850-8. — Prix: £49.00. — Cambridge University Press, Cambridge, 2015.

From social networks such as Facebook, the World Wide Web and the Internet, to the complex interactions between proteins in the cells of our bodies, we constantly face the challenge of understanding the structure and development of networks. The theory of random graphs provides a framework for this understanding, and in this book the authors give a gentle introduction to the basic tools for understanding and applying the theory. Part I includes sufficient material, including exercises, for a one semester course at the advanced undergraduate or beginning graduate level. The reader is then well prepared for the more advanced topics in Parts II and III. A final part provides a quick introduction to the background material needed. All those interested in discrete mathematics, computer science or applied probability and their applications will find this an ideal introduction to the subject.

Miroslav HAVIAR, Michal IVASKA. — **Vertex labellings of simple graphs**. — Research and exposition in mathematics, vol. 34. — Un vol. broché, 17,5×24,5, de 155 p. — ISBN 978-3-88538-234-8. — Prix: €28.00. — Heldermann Verlag, Lemgo, 2015.

Graph theory belongs to the most dynamic disciplines within present mathematics, and due to its beauty and wide applications, also to the most popular areas of mathematics. The area of graph labellings, on whose selected part this monograph is focussing, is very young. Roughly speaking, a graph labelling is an assignment of integers to the vertices or edges, or both, of a graph, subject to certain conditions. The bases of the theory of graph labellings were laid out in the late 1960s, and since then a plethora of graph labellings methods and techniques have been studied in over 1900 research papers, monographs and theses. One of the most famous open problems in graph theory nowadays is the Graceful Tree Conjecture which says that every tree can be gracefully labelled. A tree with  $m$  edges has a graceful labelling if its vertices can be assigned the labels  $0, 1, \dots, m$  such that the absolute values of the differences in vertex labels between adjacent vertices form the set  $\{1, \dots, m\}$ . The conjecture dates back to the 1960s and it is also known as the Ringel–Kotzig, Rosa or Ringel–Kotzig–Rosa Conjecture. Only limited progress has been made on the conjecture over the last fifty years despite numerous research papers and various theses and surveys. This monograph adds new results and new approaches to the existing knowledge about vertex labellings of graphs. We believe that it brings advances in the study of vertex labellings of graphs and that it will be of interest to researchers in this area. We hope that the book will initiate further development in the study of the newly introduced concepts of graph chessboards and labelling relations as useful tools to investigate vertex labellings of graphs and to tackle the Graceful tree conjecture. We believe that especially the visualization provided via the graph chessboards, and the graph processor, developed and described in this book, could make this topic more accessible to working mathematicians as well as to students starting their research work in this area.

Zoran STANIC. — **Inequalities for graph eigenvalues**. — London Mathematical Society lecture note series, vol. 423. — Un vol. broché, 15,5×23, de 298 p. — ISBN 978-1-107-54597-7. — Prix: £55.00. — Cambridge University Press, Cambridge, 2015.

Written for mathematicians working with the theory of graph spectra, this book explores more than 400 inequalities for eigenvalues of the six matrices associated with finite simple graphs: the adjacency matrix, Laplacian matrix, signless Laplacian matrix, normalized Laplacian matrix, Seidel matrix, and distance matrix. The book begins with a brief survey of the main results and selected applications to related topics,

including chemistry, physics, biology, computer science, and control theory. The author then proceeds to detail proofs, discussions, comparisons, examples, and exercises. Each chapter ends with a brief survey of further results. The author also points to open problems and gives ideas for further reading.

## ***Théorie des nombres***

John COATES, A. RAGHURAM, Anupam SAIKIA, R. SUJATHA, (Editors). — **The Bloch-Kato conjecture for the Riemann zeta function**. — London Mathematical Society lecture note series, vol. 418. — Un vol. broché, 15,5×23, de IX, 305 p. — ISBN 978-1-107-49296-7. — Prix: £50.00. — Cambridge University Press, Cambridge, 2015.

There are still many arithmetic mysteries surrounding the values of the Riemann zeta function at the odd positive integers greater than one. For example, the matter of their irrationality, let alone transcendence, remains largely unknown. However, by extending ideas of Garland, Borel proved that these values are related to the higher K-theory of the ring of integers. Shortly afterwards, Bloch and Kato proposed a Tamagawa number-type conjecture for these values, and showed that it would follow from a result in motivic cohomology which was unknown at the time. This vital result from motivic cohomology was subsequently proven by Huber, Kings, and Wildeshaus. Bringing together key results from K-theory, motivic cohomology, and Iwasawa theory, this book is the first to give a complete proof, accessible to graduate students, of the Bloch-Kato conjecture for odd positive integers. It includes a new account of the results from motivic cohomology by Huber and Kings.

Fred DIAMOND, Payman L. KASSAEI, Minhyong KIM, (Editors). — **Automorphic forms and Galois representations, vol. 2**. — London Mathematical Society lecture note series, vol. 415. — Un vol. broché, 16×23,5, de 378 p. — ISBN 978-1-107-69363-0. — Prix: £50.00. — Cambridge University Press, Cambridge, 2014.

Automorphic forms and Galois representations have played a central role in the development of modern number theory, with the former coming to prominence via the celebrated Langlands program and Wiles' proof of Fermat's last theorem. This two-volume collection arose from the 94th LMS-EPSC Durham Symposium on 'Automorphic Forms and Galois Representations' in July 2011, the aim of which was to explore recent developments in this area. The expository articles and research papers across the two volumes reflect recent interest in  $p$ -adic methods in number theory and representation theory, as well as recent progress on topics from anabelian geometry to  $p$ -adic Hodge theory and the Langlands program. The topics covered in volume two include curves and vector bundles in  $p$ -adic Hodge theory, associators, Shimura varieties, the birational section conjecture, and other topics of contemporary interest.

Luis DIEULEFAIT, D.R. HEALTH-BROWN, Gerd FALTINGS, Yuri I. MANIN, B.Z. MOROZ, Jean-Pierre WINTERBERGER. — **Arithmetic and geometry**. — London Mathematical Society lecture note series, vol. 420. — Un vol. broché, 15×22,5, de XXXIII, 503 p. — ISBN 978-1-107-46254-0. — Prix: £64.00. — Cambridge University Press, Cambridge, 2015.

The Arithmetic and geometry trimester, held at the Hausdorff Research Institute for Mathematics in Bonn, focussed on recent work on Serre's conjecture and on rational points on algebraic varieties. The resulting proceedings volume provides a modern overview of the subject for graduate students in arithmetic geometry and Diophantine geometry. It is also essential reading for any researcher wishing to keep abreast of the latest developments in the field. Highlights include Tim Browning's survey on applications of the circle method to rational points on algebraic varieties and Per Salberger's chapter on rational points on cubic hypersurfaces.

## ***Théorie des groupes et généralisations***

Brian CONRAD, Ofer GABBER, Gopal PRASAD. — **Pseudo-reductive groups**. — Second edition. — New mathematical monographs, vol. 26. — Un vol. relié, 16,5×24, de XXIV, 665 p. — ISBN 978-1-107-08723-1. — Prix: £90.00. — Cambridge University Press, Cambridge, 2015.

Pseudo-reductive groups arise naturally in the study of general smooth linear algebraic groups over non-perfect fields and have many important applications. This monograph provides a comprehensive treatment of the theory of pseudo-reductive groups and gives their classification in a usable form. In this second edition there is new material on relative root systems and Tits systems for general smooth affine groups, including the extension to quasi-reductive groups of famous simplicity results of Tits in the semisimple case. Chapter 9 has been completely rewritten to describe and classify pseudo-split absolutely pseudo-simple groups with a non-reduced root system over arbitrary fields of characteristic 2 via the useful new notion of ‘minimal type’ for pseudo-reductive groups. Researchers and graduate students working in related areas, such as algebraic geometry, algebraic group theory, or number theory will value this book, as it develops tools likely to be used in tackling other problems.

## *Fonctions de variables réelles*

Philip ANSELONE, John LEE. — **The heart of calculus: explorations and applications.** — Classroom resource materials. — Un vol. relié, 18,5×26, de XVII, 228 p. — ISBN 978-0-88385-787-8. — Prix: £38.00. — Mathematical Association of America, Washington, 2015.

*The heart of calculus* is intended primarily as enrichment material for courses in first and second year calculus. It also has material suitable for use in differential equations and introductory real analysis. The goal is to impart a deeper understanding of and facility with the mathematical reasoning that lies at the heart of calculus and to convey something of its beauty and depth. The book offers an engaging combination of topics at a challenging, yet accessible level. *The heart of calculus* targets talented and well-motivated students and can be used in a variety of settings, such as honors courses, undergraduate seminars, independent study, capstone courses taking a fresh look at calculus, and summer enrichment programs. There are sixteen chapters in the book, divided about equally between pure and applied mathematics. The first three chapters are on fundamentals of differential calculus. The last three are on the monumental discoveries of Newton and Kepler on celestial motion and gravitation. The intervening chapters present significant topics in pure and applied mathematics chosen for their intrinsic interest, historical influence, and continuing importance. The book develops topics from novel or unifying perspectives. Thus, *The heart of calculus* will be a valuable resource for graduate teaching assistants as they develop their academic and pedagogical skills and be informative to seasoned veterans who appreciate fresh perspectives. The chapters of the book are written to be largely independent of each other. There are occasional references to results from earlier chapters but adjustments appropriate to the situation at hand are easily made.

## *Équations aux dérivées partielles*

Nail H. IBRAGIMOV. — **Tensors and riemannian geometry: with applications to differential equations.** — De Gruyter graduate. — Un vol. broché, 17×24, de X, 183 p. — ISBN 978-3-11-037949-5. — Prix: €44.00. — De Gruyter, Berlin/Boston, 2015.

This book is based on the experience of teaching the subject by the author in Russia, France, South Africa and Sweden. The author provides students and teachers with an easy to follow textbook spanning a variety of topics on tensors, Riemannian geometry and geometric approach to partial differential equations. Application of approximate transformation groups to the equations of general relativity in the de Sitter space simplifies the subject significantly.

## *Analyse de Fourier, analyse harmonique abstraite*

Michael V. VESNIK. — **The method of the generalised eikonal: new approaches in the diffraction theory.** — De Gruyter studies in mathematical physics, vol. 29. — Un vol. relié, 17,5×24,5, de XI, 201 p. — ISBN 978-3-11-031112-9. — Prix: €179.95. — De Gruyter, Berlin/Boston, 2015.

Diffraction theory describes scattering mechanisms for waves of various physical nature, scattered by objects of different shapes and materials. This book proposes new methods to account for the contour

shape, edge profile and boundary conditions of three-dimensional scatterers (in particular, flat polygons and polyhedrals). A standard method to refine the physical optics approximation (PO) is the heuristic method of edge waves (MEW). In comparison with MEW, the presented approaches simplify the solving and refining the PO approximation without solving a corresponding two-dimensional problem. Furthermore these methods allow to take into account the field perturbation in the vicinity of vertices. While the analytical formulas obtained by using these new approaches are as simple as in the PO case, the accuracy can be even higher than for MEW. On the basis of the developed methods construction of solutions for wave propagation in urban area and elastic wave diffraction (including seismic waves) are proposed. The book is useful for specialists who solve scientific and engineering problems in wave propagation and for students and postgraduate students.

## *Équations intégrales*

Zgongying CHEN, Charles A. MICCHELLI, Yuesheng XU. — **Multiscale methods for Fredholm integral equations.** — Cambridge monographs on applied and computational mathematics. — Un vol. relié, 16 × 23,5, de XIII, 536 p. — ISBN 978-1-107-10347-4. — Prix: £99.99. — Cambridge University Press, Cambridge, 2015.

The recent appearance of wavelets as a new computational tool in applied mathematics has given a new impetus to the field of numerical analysis of Fredholm integral equations. This book gives an account of the state of the art in the study of fast multiscale methods for solving these equations based on wavelets. The authors begin by introducing essential concepts and describing conventional numerical methods. They then develop fast algorithms and apply these to solving linear, nonlinear Fredholm integral equations of the second kind, ill-posed integral equations of the first kind and eigen-problems of compact integral operators. Theorems of functional analysis used throughout the book are summarised in the appendix. The book is an essential reference for practitioners wishing to use the new techniques. It may also be used as a text, with the first five chapters forming the basis of a one-semester course for advanced undergraduates or beginning graduates.

## *Géométrie*

Gangsong LENG; translated by Yongming LIU. — **Geometric inequalities.** — Mathematical Olympiad series, vol. 12. — Un vol. relié, 17 × 25, de 144 p. — ISBN 978-981-4696-48-7. — Prix: £17.00. — World Scientific, Singapour, 2015.

In China, lots of excellent maths students take an active interest in various maths contests and the best six senior high school students will be selected to form the IMO National Team to compete in the International Mathematical Olympiad. In the past ten years China's IMO Team has achieved outstanding results – they won the first place almost every year. The author is one of the coaches of China's IMO National Team, whose students have won many gold medals many times in IMO. This book is part of the Mathematical Olympiad Series which discusses several aspects related to maths contests, such as algebra, number theory, combinatorics, graph theory and geometry. The book elaborates on geometric inequality problems such as inequality for the inscribed quadrilateral, the area inequality for special polygons, linear geometric inequalities, etc. Contents: – The method of segment replacement for distance inequalities. – Ptolemy's inequality and its application. – Inequality for the inscribed quadrilateral. – The area inequality for special polygons. – Linear geometric inequalities. – Algebraic methods. – Isoperimetric and extremal value problem. – Embed inequality and inequality for moment of inertia. – Locus problem of Tsintsifas's inequality. – Shum's minimal circle problem. – Inequalities for tetrahedron.

## *Géométrie différentielle*

Toshiaki ADACHI, Hideya HASHIMOTO, Milen J. HRISTOV, (Editors). — **Current developments in differential geometry and its related fields**. — Un vol. relié, 17×25, de 256 p. — ISBN 978-981-4713-78-8. — Prix: £78.00. — World Scientific, Singapour, 2015.

This volume contains contributions by the main participants of the 4th International Colloquium on Differential Geometry and its Related Fields (ICDG2014). These articles cover recent developments and are devoted mainly to the study of some geometric structures on manifolds and graphs. Readers will find a broad overview of differential geometry and its relationship to other fields in mathematics and physics. Content: Einstein metrics on the symplectic group which are not naturally reductive. – Laplacians for finite regular Kähler graphs and for their dual graphs. –  $S^1$ -invariant Einstein-Weyl structure and twistor correspondence. – A family of surfaces in  $E^3$  given by an over-determined system. – Some remarks on noncommutative instantons. – Almost CR structure on the twistor space of a quaternionic CR manifold. – Five dimensional Lie groups which are almost contact B-metric manifolds with three natural connections. – On hyperelliptic minimal surfaces with even genus. – Laplacians of Kähler graphs. – Hopf fibration and Cartan imbedding of type AI. – On totally umbilical and screen totally umbilical radical transversal lightlike hypersurfaces of Kähler-Norden manifolds. – Complex statistical manifolds and complex affine immersions. – A method of determining the  $SO(7)$ -invariants for curves in  $\text{Im}\mathbf{O}$  by their  $G_2$ -invariants. – Magnetic Jacobi fields for surface magnetic fields. – A geometric study on Laplace transformed curves. – Vector-valued Laplace transformation applied to rational Bézier curves.

Shyuichi IZUMIYA, Maria del Carmen ROMERO FUSTER, Maria Aparecida SOARES RUAS, Farid TARI. — **Differential geometry from a singularity theory viewpoint**. — Un vol. relié, 17×25, de 384 p. — ISBN 978-981-4590-44-0. — Prix: £57.00. — World Scientific, Singapour, 2015.

*Differential geometry from a singularity theory viewpoint* provides a new look at the fascinating and classical subject of the differential geometry of surfaces in Euclidean spaces. The book uses singularity theory to capture some key geometric features of surfaces. It describes the theory of contact and its link with the theory of caustics and wavefronts. It then uses the powerful techniques of these theories to deduce geometric information about surfaces embedded in 3, 4 and 5-dimensional Euclidean spaces. The book also includes recent work of the authors and their collaborators on the geometry of sub-manifolds in Minkowski spaces.

An-Min LI, Zejun HU, Udo SIMON, GUOSONG ZHAO. — **Global affine differential geometry of hypersurfaces**. — Second revised and extended edition. — Expositions in mathematics, vol. 11. — Un vol. relié, 17,5×24,5, de IX, 365 p. — ISBN 978-3-11-026667-2. — Prix: €119.00. — De Gruyter, Berlin/Boston, 2015.

This book draws a colorful and widespread picture of global affine hypersurface theory up to the most recent state. Moreover, the recent development revealed that affine differential geometry – as differential geometry in general – has an exciting intersection area with other fields of interest, like partial differential equations, global analysis, convex geometry and Riemann surfaces. The second edition of this monograph leads the reader from introductory concepts to recent research. Since the publication of the first edition in 1993 there appeared important new contributions, like the solutions of two different affine Bernstein conjectures, due to Chern and Calabi, respectively. Moreover, a large subclass of hyperbolic affine spheres were classified in recent years, namely the locally strongly convex Blaschke hypersurfaces that have parallel cubic form with respect to the Levi-Civita connection of the Blaschke metric. The authors of this book present such results and new methods of proof.

Yong-Geun OH. — **Symplectic topology and Floer homology. Vol. 1 : symplectic geometry and pseudoholomorphic curves**. — New mathematical monographs, vol. 28. — Un vol. relié, 16×24, de 395 p. — ISBN 978-1-107-07245-9. — Prix: £89.99. — Cambridge University Press, Cambridge, 2015.

Published in two volumes, this is the first book to provide a thorough and systematic explanation of symplectic topology, and the analytical details and techniques used in applying the machinery arising from

Floer theory as a whole. Volume 1 covers the basic materials of Hamiltonian dynamics and symplectic geometry and the analytic foundations of Gromov's pseudoholomorphic curve theory. One novel aspect of this treatment is the uniform treatment of both closed and open cases and a complete proof of the boundary regularity theorem of weak solutions of pseudo-holomorphic curves with totally real boundary conditions. Volume 2 provides a comprehensive introduction to both Hamiltonian Floer theory and Lagrangian Floer theory. *Symplectic topology and Floer homology* is a comprehensive resource suitable for experts and newcomers alike.

## ***Topologie algébrique***

Yves FELIX, Steve HALPERIN, Jean-Claude THOMAS. — **Rational homotopy theory II.** — Un vol. relié, 16×24, de XXXVI, 412 p. — ISBN 978-981-4651-42-4. — Prix: US\$91.00. — World Scientific, Hackensack, New Jersey, 2015.

This research monograph is a detailed account with complete proofs of rational homotopy theory for general non-simply connected spaces, based on the minimal models introduced by Sullivan in his original seminal article. Much of the content consists of new results, including generalizations of known results in the simply connected case. The monograph also includes an expanded version of recently published results about the growth and structure of the rational homotopy groups of finite dimensional CW complexes, and concludes with a number of open questions. This monograph is a sequel to the book *Rational homotopy theory*, published by Springer in 2001, but is self-contained except only that some results from *Rational homotopy theory* are simply quoted without proof.

## ***Topologie des variétés, analyse globale et analyse des variétés***

Weiping LI. — **Lecture notes on knot invariants** . — Un vol. broché, 16×24, de XII, 232 p. — ISBN 978-981-4675-96-3. — Prix: £25.00. — World Scientific, Singapour, 2015.

The volume is focused on the basic calculation skills of various knot invariants defined from topology and geometry. It presents the detailed Hecke algebra and braid representation to illustrate the original Jones polynomial (rather than the algebraic formal definition many other books and research articles use) and provides self-contained proofs of the Tait conjecture (one of the big achievements from the Jones invariant). It also presents explicit computations to the Casson-Lin invariant via braid representations. With the approach of an explicit computational point of view on knot invariants, this user-friendly volume will benefit readers to easily understand low-dimensional topology from examples and computations, rather than only knowing terminologies and theorems. Contents: Basic knots, links and their equivalences. – Braids and links. – Knot and link invariants. – Jones Polynomials. – Casson type invariants.

## ***Probabilités et processus stochastiques***

Robert C. DALANG, Daniel CONUS. — **Introduction à la théorie des probabilités.** — Deuxième édition revue et augmentée. — Enseignement des mathématiques. — Un vol. broché, 16,5×24,5, de 212 p. — ISBN 978-2-88915-148-6. — Prix: SFr. 45.00. — Presses polytechniques et universitaires romandes, Lausanne, 2015.

Cet ouvrage est une première introduction à la théorie mathématique des probabilités. Il présente avec rigueur les notions fondamentales du calcul des probabilités: les espaces de probabilités, les variables aléatoires discrètes et continues, leurs fonctions de répartition et de densité, de même que les notions d'espérance, d'espérance conditionnelle et les principaux théorèmes limites. Sans recourir à la théorie de la mesure, ce livre contient néanmoins une démonstration complète de chaque résultat présenté et, en particulier, du théorème limite central. Afin de faciliter l'assimilation de la matière, chaque chapitre se termine par un grand nombre d'exercices – tant élémentaires que plus théoriques – pour la plupart assortis d'une solution

complète et détaillée, et des exercices de révision sont proposés en fin d'ouvrage. L'approche mathématique rigoureuse de cet ouvrage, qui ne nécessite cependant aucune connaissance préalable en théorie de la mesure, comble un vide entre les nombreux ouvrages d'introduction aux probabilités et les ouvrages avancés de théorie des probabilités basés sur la théorie de la mesure. Conçu comme support pour un premier cours de théorie des probabilités au sein des universités et grandes écoles d'ingénieurs, cet ouvrage s'adresse en priorité aux étudiants mathématiciens et à tous ceux très intéressés par les mathématiques. Cette deuxième édition entièrement revue est augmentée de nombreux nouveaux exercices corrigés.

David STIRZAKER. — **The Cambridge dictionary of probability and its applications**. — Un vol. relié, 19×25, de 419 p. — ISBN 978-1-107-07516-0. — Prix: £120.00. — Cambridge University Press, Cambridge, 2015.

Probability comes of age with this, the first dictionary of probability and its applications in English, which supplies a guide to the concepts and vocabulary of this rapidly expanding field. Besides the basic theory of probability and random processes, applications covered here include financial and insurance mathematics, operations research (including queueing, reliability, and inventories), decision and game theory, optimization, time series, networks, and communication theory, as well as classic problems and paradoxes. The dictionary is reliable, stable, concise, and cohesive. Each entry provides a rigorous definition, a sketch of the context, and a reference pointing the reader to the wider literature. Judicious use of figures makes complex concepts easier to follow without oversimplifying. As the only dictionary on the market, this will be a guiding reference for all those working in, or learning, probability together with its applications.

## Analyse numérique

Timo HEISTER, Leo G. REBHOLZ. — **Scientific computing for scientists and engineers**. — De Gruyter textbook. — Un vol. broché, 17,5×24,5, de XI, 138 p. — ISBN 978-3-11-035940-4. — Prix: US\$19.90. — De Gruyter, Berlin, 2015.

*Scientific computing for scientists and engineers* is designed to teach undergraduate students relevant numerical methods and required fundamentals in scientific computing. Most problems in science and engineering require the solution of mathematical problems, most of which can only be done on a computer. Accurately approximating those problems requires solving differential equations and linear systems with millions of unknowns, and smart algorithms can be used on computers to reduce calculation times from years to minutes or even seconds. This book explains: How can we approximate these important mathematical processes? How accurate are our approximations? How efficient are our approximations?

Michael KALTENBACK. — **Fundament Analysis**. — Berliner Studienreihe zur Mathematik, Bd. 26. — Un vol. relié, 18×25, de 488 p. — ISBN 978-3-88538-126-6. — Prix: €38.00. — Heldermann Verlag, Lemgo, 2014.

Das vorliegende Buch ist eine Einführung in die Welt der Analysis und richtet sich vorrangig an Mathematikstudenten im ersten Studienjahr. Einerseits soll es als Lehrbuch für die Analysis Grundvorlesungen dienen, andererseits soll es später als Nachschlagewerk verwendet werden können. Das Buch wurde so verfasst, dass es auch zum Selbststudium geeignet ist. Insbesondere beinhaltet es eine umfangreiche Sammlung von Übungsaufgaben, die sich inhaltlich passend jeweils am Ende der einzelnen Kapitel befinden. Nach einer kurzen Einführung zu Mengen und Funktionen befasst sich das Buch zunächst mit den algebraischen und ordnungstheoretischen Eigenschaften der reellen Zahlen. Anschließend werden die klassischen Konzepte der Analysis, wie Konvergenz von Folgen bzw. Reihen, Stetigkeit und Differenzierbarkeit von Funktionen, Integrale, Differentialrechnung in mehreren Variablen und Vektor- bzw. Gradientenfelder behandelt. Aufbauend auf die Theorie der Gradientenfelder wird auch eine kurze Einführung in die komplexe Analysis gegeben. Das Lehrbuch schließt mit einem Kapitel über mengentheoretische Topologie. Alle auftretenden Begriffe sind grundlegend erklärt, und durch zahlreiche Bilder und durchgerechnete Beispiele wird versucht, die angegebenen Methoden und Resultate zu illustrieren.

## *Systems, control*

Michel BIERLAIRE. — **Optimization: principles and algorithms.** — Un vol. broché, 16×24, de XVI, 718 p. — ISBN 978-1-4822-0345-5. — Prix: SFr. 89.50. — Presses polytechniques et universitaires romandes, Lausanne, 2015.

Every engineer and decision scientist must have a good mastery of optimization, an essential element in their toolkit. Thus, this articulate introductory textbook will certainly be welcomed by students and practicing professionals alike. Drawing from his vast teaching experience, the author skillfully leads the reader through a rich choice of topics in a coherent, fluid and tasteful blend of models and methods anchored on the underlying mathematical notions (only prerequisites: first year calculus and linear algebra). Topics range from the classics to some of the most recent developments in smooth unconstrained and constrained optimization, like descent methods, conjugate gradients, Newton and quasi-Newton methods, linear programming and the simplex method, trust region and interior point methods. Furthermore elements of discrete and combinatorial optimization like network optimization, integer programming and heuristic local search methods are also presented. This book presents optimization as a modeling tool that beyond supporting problem formulation plus design and implementation of efficient algorithms, also is a language suited for interdisciplinary human interaction. Readers further become aware that while the roots of mathematical optimization go back to the work of giants like Newton, Lagrange, Cauchy, Euler or Gauss, it did not become a discipline on its own until World War Two. Also that its present momentum really resulted from its symbiosis with modern computers, which made it possible to routinely solve problems with millions of variables and constraints. With his witty, entertaining, yet precise style, Michel Bierlaire captivates his readers and awakens their desire to try out the presented material in a creative mode. One of the outstanding assets of this book is the unified, clear and concise rendering of the various algorithms, which makes them easily readable and translatable into any high level programming language.

## *Information, communication, circuits*

Gilbert BAUMSLAG, Benjamin FINE, Martin KREUZER, Gerhard ROSENBERGER. — **A course in mathematical cryptography.** — De Gruyter graduate. — Un vol. broché, 17,5×24,5, de 376 p. — ISBN 978-3-11-037276-2. — Prix: US\$70.00. — De Gruyter, Berlin, 2015.

Cryptography has become essential as bank transactions, credit card information, contracts, and sensitive medical information are sent through insecure channels. This book is concerned with the mathematical, especially algebraic, aspects of cryptography. It grew out of many courses presented by the authors over the past twenty years at various universities and covers a wide range of topics in mathematical cryptography. It is primarily geared towards graduate students and advanced undergraduates in mathematics and computer science, but may also be of interest to researchers in the area. Besides the classical methods of symmetric and private key encryption, the book treats the mathematics of cryptographic protocols and several unique topics such as group-based cryptography, Gröbner basis methods in cryptography, Lattice-based cryptography.