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Généralités

Ravi P. Agarwal, Syamal K. Sen. — **Creators of mathematical and computational sciences**. — Un vol. relié, 16×24, de XX, 495 p. — ISBN 978-3-319-10869-8. — Prix: SFr. 126.50. — Springer, Cham, 2014.

A comprehensive biography on some of the seminal figures of mathematics and theoretical computer science from early to modern history. The book records the essential discoveries of mathematical and computational scientists in chronological order, following the birth of ideas on the basis of prior ideas ad infinitum. The authors document the winding path of mathematical scholarship throughout history, and most importantly, the thought process of each individual that resulted in the mastery of their subject. The book implicitly addresses the nature and character of every scientist as one tries to understand their visible actions in both adverse and congenial environments. The authors hope that this will enable the reader to understand their mode of thinking, and perhaps even to emulate their virtues in life.

Marlow Anderson, Todd Feil. — **A first course in abstract algebra : rings, groups, and fields**. — Third edition. — Un vol. relié, 18×26, de XVI, 536 p. — ISBN 978-1-4822-4552-3. — Prix: US$89.95. — CRC Press, Boca Raton, 2015.

Like its popular predecessors, *A first course in abstract algebra: rings, groups, and fields, third edition* develops ring theory first by drawing on students' familiarity with integers and polynomials. This unique approach motivates students in the study of abstract algebra and helps them understand the power of abstraction. The authors introduce groups later on using examples of symmetries of figures in the plane and space as well as permutations. New to the third edition: Makes it easier to teach unique factorization as an optional topic, reorganizes the core material on rings, integral domains, and fields, includes a more detailed treatment of permutations, introduces more topics in group theory, including new chapters on Sylow theorems, provides many new exercises on Galois theory. The text includes straightforward exercises within each chapter for students to quickly verify facts, warm-up exercises following the chapter that test fundamental comprehension, and regular exercises concluding the chapter that consist of computational and supply-the-proof problems. Historical remarks discuss the history of algebra to underscore certain pedagogical points. Each section also provides a synopsis that presents important definitions and theorems, allowing students to verify the major topics from the section.

Ellie Baker, Susan Goldstine. — **Crafting conundrums : puzzles and patterns for the bead crochet artist**. — Un vol. relié, 22×29, de XIII, 250 p. — ISBN 978-1-4665-8848-6. — Prix: US$35.96. — CRC Press, Boca Raton, 2015.

Designed for crafters, puzzle lovers, and pattern designers alike, *Crafting conundrums: puzzles and patterns for the bead crochet artist* provides methods, challenges, and patterns that offer a springboard for creative exploration. All are illustrated with beautiful color diagrams and photographs. Experienced bead crochet crafters looking for a project may choose to skip ahead to the pattern pages and begin crocheting from an abundance of unique, mathematically inspired designs. Those wishing to design their own patterns will find many useful tools, template patterns, and a new methodology for understanding how to do so

even without using math. Puzzle lovers without previous knowledge of bead crochet will also find ample inspiration for learning the craft. The first part of the book describes the basic requirements and constraints of a bead crochet pattern and explains what makes designing in this medium so tricky. The authors present their new design framework and offer insight on how best to approach design choices and issues unique to bead crochet. The second part presents a series of bead crochet design challenges informed by colorful bits of mathematics, including topology, graph theory, knot theory, tessellations, and wallpaper groups. Each chapter in this section begins with a design puzzle accompanied by an introduction to the mathematical idea that inspired it. The authors then discuss what made the challenge difficult, present some of their solutions, and describe the thinking and ideas behind their approach. The final part contains nearly 100 original bead crochet patterns, including solutions to all the design challenges. This part also provides a tutorial on the fundamentals of bead crochet technique. Behind the deceptively simple and uniform arrangement of beads is a subtle geometry that produces compelling design challenges and fascinating mathematical structures. In color throughout, *Crafting conundrums* gives both math enthusiasts and crafters an innovative approach to creating bead crochet patterns while addressing a variety of mathematically inspired design questions. Supplementary materials, including demo videos, are available on the book's CRC Press web page.

Jason I. Brown. — **Mathematics for the liberal arts**. — Un vol. relié, 18,5×26, de XXIV, 416 p. — ISBN 978-1-4665-9336-7. — Prix: US$89.95. — CRC Press, Boca Raton, 2015.

Mathematics for the liberal arts teaches everyday mathematics topics to non-math majors at the undergraduate level. Through numerous examples and more than 600 exercises, students learn how to use math seamlessly in a variety of practical areas, from conversion factors, statistics, visualization, money, and risk to games, art, music, and humor. The text develops a logical, real-world approach to data and reasoning, showing students how to: Think both analytically and visually about data. – Use graphics to make a point. – Make sound monetary and nonmonetary decisions. – Evaluate risk taking. – Strategize to win at games. – Appreciate more fully art, music, and humor. Going beyond mere numerics and calculations, this textbook helps students become life-long learners exceeding the confines of a course. They will find that with a little more math, their daily lives will be more productive, understandable, and creative. Features: Teaches practical mathematics topics to undergraduate students who are not math majors. – Meets the quantitative reasoning requirements for math for liberal arts courses. – Uses real-life stories in each chapter to capture students' interest and motivate them to work through the math. – Encourages students to apply the methods outside of the classroom. – Includes historical background as well as mathematical formulas, results, and principles. – Contains exercises at the end of each section and at the end of each chapter, totaling more than 600 throughout the book.

Stéphane Durand. — **Comprendre Einstein en animant soi-même l'espace-temps**. — Un vol. relié, 19×26, de 95 p. — ISBN 978-2-7011-9284-0. — Prix: €15.00. — Belin, Paris, 2014.

Le temps et l'espace sont des notions si familières que nous considérons souvent qu'elles "vont de soi". Pourtant, la théorie de la relativité a totalement bouleversé ces deux concepts au début du XXe siècle: l'écoulement du temps peut ralentir, deux personnes peuvent vieillir à des rythmes différents, la vitesse de la lumière est une limite infranchissable et la distinction entre passé, présent et futur n'est qu'une "illusion de la réalité" pour reprendre les termes d'Einstein … L'auteur propose de décrypter ces phénomènes déroutants dans un ouvrage ludique et interactif. En faisant glisser une feuille opaque percée d'une fente, vous comprendrez de façon visuelle et intuitive les aspects les plus troublants de la relativité, que vous en connaissiez ou non les fondements. Les questions que vous n'avez jamais osé poser sur cette théorie trouveront enfin leur réponse!

Michael Harris. — **Mathematics without apologies: portrait of a problematic vocation**. — Un vol. relié, 16×24, de XII, 438 p. — ISBN 978-0-691-15423-7. — Prix: US$29.95. — Princeton University Press, Princeton, 2015.

What do pure mathematicians do, and why do they do it? Looking beyond the conventional answers—for the sake of truth, beauty, and practical applications—this book offers an eclectic panorama of the lives and values and hopes and fears of mathematicians in the twenty-first century, assembling material from a startlingly diverse assortment of scholarly, journalistic, and pop culture sources. Drawing on his personal

experiences and obsessions as well as the thoughts and opinions of mathematicians from Archimedes and Omar Khayyám to such contemporary giants as Alexander Grothendieck and Robert Langlands, Michael Harris reveals the charisma and romance of mathematics as well as its darker side. In this portrait of mathematics as a community united around a set of common intellectual, ethical, and existential challenges, he touches on a wide variety of questions, such as: Are mathematicians to blame for the 2008 financial crisis? How can we talk about the ideas we were born too soon to understand? And how should you react if you are asked to explain number theory at a dinner party? Disarmingly candid, relentlessly intelligent, and richly entertaining, *Mathematics without apologies* takes readers on an unapologetic guided tour of the mathematical life, from the philosophy and sociology of mathematics to its reflections in film and popular music, with detours through the mathematical and mystical traditions of Russia, India, medieval Islam, the Bronx, and beyond.

Julian Havil. — **The irrationals : a story of the numbers you can't count on**. — Un vol. broché, 15,5×23,5, de IX, 298 p. — ISBN 978-0-691-16353-6. — Prix: £12.95. — Princeton University Press, Princeton, 2012.

The ancient Greeks discovered them, but it wasn't until the nineteenth century that irrational numbers were properly understood and rigorously defined, and even today not all their mysteries have been revealed. In *The Irrationals*, the first popular and comprehensive book on the subject, Julian Havil tells the story of irrational numbers and the mathematicians who have tackled their challenges, from antiquity to the twenty-first century. Along the way, he explains why irrational numbers are surprisingly difficult to define—and why so many questions still surround them. Fascinating and illuminating, this is a book for everyone who loves math and the history behind it.

Antoine Houlou-garcia. — **Le monde est-il mathématique? Les maths au prisme des sciences humaines**. — Préface de Michel Bouchaud. — Champion Essais, vol. 38. — Un vol. broché, 13×20, de 135 p. — ISBN 978-2-7453-2818-2. — Prix: €25.00. — Honoré Champion, Paris, 2015.

Dans ce livre aux multiples facettes, l'auteur s'attache à comprendre à quel point les outils de base du mathématicien ne sont pas "mathématiques" : ils sont psychologiques, esthétiques, sociaux, idéologiques, moraux ou encore philosophiques. On s'affranchit ainsi de l'habituel cloisonnement du savoir pour s'inscrire dans la perspective résolument moderne d'une réflexion transversale où résoudre une équation n'empêche pas de traquer les concepts philosophiques qui la sous-tendent, de cerner la part d'innovation esthétique qu'apporte sa résolution, de comprendre les mécanismes intellectuels qu'elle soulève, ni de penser à la manière idéologique dont elle a pu être formalisée à travers les âges, ni de saisir et de discuter ses implications dans le domaine de l'économie ou encore de les mettre en regard de la démocratie. Ce livre, préfacé par Michel Bouchaud, proviseur du lycée Louis le Grand, et postfacé par François Magnien, agrégé de mathématiques, n'a d'objectif qu'une méthode : déconstruire les mathématiques pour en comprendre le sens, les enjeux et l'esthétique.

Brian P. Katz, Michael Starbird. — **Distilling ideas: an introduction to mathematical thinking: graphs, groups, calculus**. — Mathematics through inquiry. — Un vol. broché, 15×22,5, de XVI, 171 p. — ISBN 978-1-93951-203-1. — Prix: US$54.00. — The Mathematical Association of America, Washington, 2013.

Designed for undergraduate students and lecturers, this text guides its users to develop the skills, attitudes, and habits of mind of a mathematician. It presents a carefully designed sequence of exercises and theorems so that its readers will be directed to discover mathematical ideas, strategies of proof, and strategies of thinking. Through the exploration of interesting mathematical content including graphs, groups, and calculus, this book helps to foster habits of inquiry. This book can be used by instructors as a text for an inquiry-based introduction to proof course, or as an independent study guide for mathematics students. The three core mathematical topics are presented separately, and each helps students develop theorem-proving skills and strategies of thinking whilst also providing an organised set of challenges that lead students to understand the process of mathematical creativity and development.

An ideal textbook for a first course in proof-based mathematics. - Presents a carefully designed sequence of exercises and theorems that challenge students to create proofs and concepts. - Accessible to readers without a background in abstract mathematics as the concepts arise from questions about everyday experience.

Mircea Pitici, (Editor). — **The best writing on mathematics 2014**. — Un vol. broché, 14×22, de XXII, 336 p. — ISBN 978-0-691-16417-5. — Prix: US$24.95. — Princeton University Press, Princeton, 2015.

This annual anthology brings together the year's finest mathematics writing from around the world. Featuring promising new voices alongside some of the foremost names in the field, *The best writing on mathematics 2014* makes available to a wide audience many articles not easily found anywhere else—and you don't need to be a mathematician to enjoy them. These writings offer surprising insights into the nature, meaning, and practice of mathematics today. They delve into the history, philosophy, teaching, and everyday occurrences of math, and take readers behind the scenes of today's hottest mathematical debates. Here John Conway presents examples of arithmetical statements that are almost certainly true but likely unprovable; Carlo Séquin explores, compares, and illustrates distinct types of one-sided surfaces known as Klein bottles; Keith Devlin asks what makes a video game good for learning mathematics and shows why many games fall short of that goal; Jordan Ellenberg reports on a recent breakthrough in the study of prime numbers; Stephen Pollard argues that mathematical practice, thinking, and experience transcend the utilitarian value of mathematics; and much, much more. In addition to presenting the year's most memorable writings on mathematics, this must-have anthology includes an introduction by editor Mircea Pitici. This book belongs on the shelf of anyone interested in where math has taken us—and where it is headed.

Jacques Sesiano. — **Euler et le parcours du cavalier: avec une annexe sur le théorème des polyèdres**. — Histoire des mathématiques. — Un vol. broché, 16×24, de VII, 272 p. — ISBN 978-2-88074-857-9. — Prix: SFr. 65.00. — Presses polytechniques et universitaires romandes, Lausanne, 2015.

Le problème du cavalier consiste à parcourir toutes les cases d'un échiquier, et une seule fois chacune, en sautant à une case distante de deux cases horizontalement et d'une case verticalement, ou inversement. S'il n'est guère difficile de couvrir une cinquantaine de cases, les tentatives de couvrir tout l'échiquier se révéleront le plus souvent décourageantes. C'est pourquoi la découverte d'un moyen de parvenir à un trajet complet a définitivement associé ce problème au nom de Euler (1707–1783). Cet ouvrage rapporte l'ensemble de ses recherches, en tenant compte de ses notes manuscrites inédites (reproduites aussi en appendice). De même, son théorème des polyèdres, l'une de ses autres découvertes majeures, est enrichi ici par sa première démonstration, restée manuscrite. Cet ouvrage intéressera les étudiants et les enseignants de mathématiques, mais aussi un public plus général, car les raisonnements d'Euler ne font appel à aucune connaissance profonde des mathématiques. Ne sachant comment aborder le problème du cavalier, Euler recourt aux essais, et peu à peu établit une théorie en fonction du succès ou de l'insuccès de ses tentatives. Pour le théorème des polyèdres, ce sont des analogies avec le cas des polygones qui le mèneront à la démonstration. Dans les deux cas, le lecteur assistera ici à la naissance et au développement d'une théorie nouvelle.

Analyse combinatoire

Lowell W. Beineke, Robin J. Wilson, (Editors). — **Topics in chromatic graph theory**. — Encyclopedia of mathematics and its applications, vol. 156. — Un vol. relié, 16×24, de XVI, 370 p. — ISBN 978-1-107-03350-4. — Prix: £79.99. — Cambridge University Press, Cambridge, 2015.

Chromatic graph theory is a thriving area that uses various ideas of 'colouring' (of vertices, edges, and so on) to explore aspects of graph theory. It has links with other areas of mathematics, including topology, algebra and geometry, and is increasingly used in such areas as computer networks, where colouring algorithms form an important feature. While other books cover portions of the material, no other title has such a wide scope as this one, in which acknowledged international experts in the field provide a broad survey of the subject. All fifteen chapters have been carefully edited, with uniform notation and terminology applied throughout. Bjarne Toft (Odense, Denmark), widely recognized for his substantial contributions to

the area, acted as academic consultant. The book serves as a valuable reference for researchers and graduate students in graph theory and combinatorics and as a useful introduction to the topic for mathematicians in related fields.

Arthur Benjamin, Gary Chartrand, Ping Zhang. — **The fascinating world of graph theory**. — Un vol. relié, 16×24, de XI, 322 p. — ISBN 978-0-691-16381-9. — Prix: US$29.95. — Princeton University Press, Princeton, 2015.

The fascinating world of graph theory goes back several centuries and revolves around the study of graphs—mathematical structures showing relations between objects. With applications in biology, computer science, transportation science, and other areas, graph theory encompasses some of the most beautiful formulas in mathematics—and some of its most famous problems. For example, what is the shortest route for a traveling salesman seeking to visit a number of cities in one trip? What is the least number of colors needed to fill in any map so that neighboring regions are always colored differently? Requiring readers to have a math background only up to high school algebra, this book explores the questions and puzzles that have been studied, and often solved, through graph theory. In doing so, the book looks at graph theory's development and the vibrant individuals responsible for the field's growth. Introducing graph theory's fundamental concepts, the authors explore a diverse plethora of classic problems such as the Lights Out Puzzle, the Minimum Spanning Tree Problem, the Königsberg Bridge Problem, the Chinese Postman Problem, a Knight's Tour, and the Road Coloring Problem. They present every type of graph imaginable, such as bipartite graphs, Eulerian graphs, the Petersen graph, and trees. Each chapter contains math exercises and problems for readers to savor. An eye-opening journey into the world of graphs, this book offers exciting problem-solving possibilities for mathematics and beyond.

Richard P. Stanley. — **Catalan numbers**. — Un vol. broché, 15×23, de VIII, 215 p. — ISBN 978-1-107-42774-7. — Prix: £19.99. — Cambridge University Press, New York, 2015.

Catalan numbers are probably the most ubiquitous sequence of numbers in mathematics. This book gives for the first time a comprehensive collection of their properties and applications to combinatorics, algebra, analysis, number theory, probability theory, geometry, topology, and other areas. Following an introduction to the basic properties of Catalan numbers, the book presents 214 different kinds of objects counted by them in the form of exercises with solutions. The reader can try solving the exercises or simply browse through them. Some 68 additional exercises with prescribed difficulty levels present various properties of Catalan numbers and related numbers, such as Fuss-Catalan numbers, Motzkin numbers, Schröder numbers, Narayana numbers, super Catalan numbers, q-Catalan numbers and (q,t)-Catalan numbers. The book ends with a history of Catalan numbers by Igor Pak and a glossary of key terms. Whether your interest in mathematics is recreation or research, you will find plenty of fascinating and stimulating facts here.

Théorie des nombres

Fred Diamond, Payman L. Kassaei, Minhyong Kim, (Editors). — **Automorphic forms and Galois representations. Volume 1**. — London Mathematical Society lecture note series, vol. 414. — Un vol. broché, 15,5×23, de IX, 374 p. — ISBN 978-1-107-69192-6. — 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-EPSRC 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 one include the Shafarevich conjecture, effective local Langlands correspondence, p-adic L-functions, the fundamental lemma, and other topics of contemporary interest.

Gerhard Larcher, Friedrich Pillichshammer, Arne Winterhof, Chaoping Xing, (Editors). — **Applied algebra and number theory: Essays in honor of Harald Niederreiter on the occasion of his 70th birthday**. — Un vol. relié, 16×23,5, de IX, 335 p. — ISBN 978-1-107-07400-2. — Prix: £65.00. — Cambridge University Press, Cambridge, 2014.

Harald Niederreiter's pioneering research in the field of applied algebra and number theory has led to important and substantial breakthroughs in many areas. This collection of survey articles has been authored by close colleagues and leading experts to mark the occasion of his 70th birthday. The book provides a modern overview of different research areas, covering uniform distribution and quasi-Monte Carlo methods as well as finite fields and their applications, in particular, cryptography and pseudorandom number generation. Many results are published here for the first time. The book serves as a useful starting point for graduate students new to these areas or as a refresher for researchers wanting to follow recent trends.

Géométrie algébrique

Christopher D. Hacon, Mircea Mustata, Mihnea Popa, (Editors). — **Recent advances in algebraic geometry: a volume in honor of Rob Lazarsfeld's 60th birthday**. — London Mathematical Society lecture note series, vol. 417. — Un vol. relié, 15,5×23, de XIII, 436 p. — ISBN 978-1-107-64755-8. — Prix: £65.00. — Cambridge University Press, Cambridge, 2015.

Contemporary research in algebraic geometry is the focus of this collection, which presents articles on modern aspects of the subject. The list of topics covered is a roll-call of some of the most important and active themes in this thriving area of mathematics: the reader will find articles on birational geometry, vanishing theorems, complex geometry and Hodge theory, free resolutions and syzygies, derived categories, invariant theory, moduli spaces, and related topics, all written by leading experts. The articles, which have an expository flavour, present an overall picture of current research in algebraic geometry, making this book essential for researchers and graduate students. This volume is the outcome of the conference Recent Advances in Algebraic Geometry, held in Ann Arbor, Michigan, to honour Rob Lazarsfeld's many contributions to the subject on the occasion of his 60th birthday.

Algèbre linéaire et multilinéaire, théorie des matrices

Yisong Yang. — **A concise text on advanced linear algebra**. — Un vol. broché, 15×23, de XIII, 318 p. — ISBN 978-1-107-45681-5. — Prix: £29.99. — Cambridge University Press, Cambridge, 2015.

This engaging textbook for advanced undergraduate students and beginning graduates covers the core subjects in linear algebra. The author motivates the concepts by drawing clear links to applications and other important areas, such as differential topology and quantum mechanics. The book places particular emphasis on integrating ideas from analysis wherever appropriate. For example, the notion of determinant is shown to appear from calculating the index of a vector field which leads to a self-contained proof of the fundamental theorem of algebra, and the Cayley-Hamilton theorem is established by recognizing the fact that the set of complex matrices of distinct eigenvalues is dense. The material is supplemented by a rich collection of over 350 mostly proof-oriented exercises, suitable for students from a wide variety of backgrounds. Selected solutions are provided at the back of the book, making it suitable for self-study as well as for use as a course text.

Théorie des groupes et généralisations

Anthony G. O'Farrell, Ian Short. — **Reversibility in dynamics and group theory**. — London Mathematical Society lecture note series, vol. 416. — Un vol. relié, 15,5×23, de XII, 281 p. — ISBN 978-1-107-44288-7. — Prix: £40.00. — Cambridge University Press, Cambridge, 2015.

Reversibility is a thread woven through many branches of mathematics. It arises in dynamics, in systems that admit a time-reversal symmetry, and in group theory where the reversible group elements are those that are conjugate to their inverses. However, the lack of a lingua franca for discussing reversibility means that researchers who encounter the concept may be unaware of related work in other fields. This text is the first to make reversibility the focus of attention. The authors fix standard notation and terminology, establish the basic common principles, and illustrate the impact of reversibility in such diverse areas as group theory, differential and analytic geometry, number theory, complex analysis and approximation theory. As well as showing connections between different fields, the authors' viewpoint reveals many open questions, making this book ideal for graduate students and researchers. The exposition is accessible to readers at the advanced undergraduate level and above.

Amritanshu Prasad. — **Representation theory: a combinatorial viewpoint**. — Cambridge studies in advanced mathematics, vol. 147. — Un vol. relié, 15,5×23,5, de XII, 191 p. — ISBN 978-1-107-08205-2. — Prix: £50.00. — Cambridge University Press, Delhi, 2015.

This book discusses the representation theory of symmetric groups, the theory of symmetric functions and the polynomial representation theory of general linear groups. The first chapter provides a detailed account of necessary representation-theoretic background. An important highlight of this book is an innovative treatment of the Robinson-Schensted-Knuth correspondence and its dual by extending Viennot's geometric ideas. Another unique feature is an exposition of the relationship between these correspondences, the representation theory of symmetric groups and alternating groups and the theory of symmetric functions. Schur algebras are introduced very naturally as algebras of distributions on general linear groups. The treatment of Schur-Weyl duality reveals the directness and simplicity of Schur's original treatment of the subject. In addition, each exercise is assigned a difficulty level to test readers' learning. Solutions and hints to most of the exercises are provided at the end.

Groupes topologiques, groupes et algèbres de Lie

Dirk Hofmann, Gavin J. Seal, Walter Tholen, (Editors). — **Monoidal topology: a categorical approach to order, metric, and topology**. — Encyclopedia of mathematics and its applications, vol. 153. — Un vol. relié, 16×24, de XVII, 503 p. — ISBN 978-1-107-06394-5. — Prix: £80.00. — Cambridge University Press, Cambridge, 2015.

Monoidal topology describes an active research area that, after various past proposals on how to axiomatize 'spaces' in terms of convergence, began to emerge at the beginning of the millennium. It combines Barr's relational presentation of topological spaces in terms of ultrafilter convergence with Lawvere's interpretation of metric spaces as small categories enriched over the extended real half-line. Hence, equipped with a quantale V (replacing the reals) and a monad T (replacing the ultrafilter monad) laxly extended from set maps to V-valued relations, the book develops a categorical theory of (T,V)-algebras that is inspired simultaneously by its metric and topological roots. The book highlights in particular the distinguished role of equationally defined structures within the given lax-algebraic context and presents numerous new results ranging from topology and approach theory to domain theory. All the necessary pre-requisites in order and category theory are presented in the book.

Fonctions d'une variable complexe

Ronald G. Douglas, Steven G. Krantz, Eric T. Sawyer, Sergei Treil, Brett D. Wick, (Editors). — **The corona problem: connections between operator theory, function theory, and geometry**. — Fields Institute communications, vol. 72. — Un vol. relié, 16×24, de VIII, 231 p. — ISBN 978-1-4939-1254-4. — Prix: US$109.00. — Springer, New York, 2014.

The purpose of the corona workshop was to consider the corona problem in both one and several complex variables, both in the context of function theory and harmonic analysis as well as the context

of operator theory and functional analysis. It was held in June 2012 at the Fields Institute in Toronto, and attended by about fifty mathematicians. This volume validates and commemorates the workshop, and records some of the ideas that were developed within. The corona problem dates back to 1941. It has exerted a powerful influence over mathematical analysis for nearly 75 years. There is material to help bring people up to speed in the latest ideas of the subject, as well as historical material to provide background. Particularly noteworthy is a history of the corona problem, authored by the five organizers, that provides a unique glimpse at how the problem and its many different solutions have developed. There has never been a meeting of this kind, and there has never been a volume of this kind. Mathematicians—both veterans and newcomers—will benefit from reading this book. This volume makes a unique contribution to the analysis literature and will be a valuable part of the canon for many years to come.

Vladimir N. Dubinin. — **Condenser capacities and symmetrization in geometric function theory**. — Translated from the Russian by Nikolai G. Kruzhilin. — Un vol. relié, 16×24, de XII, 344 p. — ISBN 978-3-0348-0842-2. — Prix: SFr. 126.50. — Springer / Birkhäuser, Basel, 2014.

This is the first systematic presentation of the capacitory approach and symmetrization in the context of complex analysis. The content of the book is original - the main part has not been covered by existing textbooks and monographs. After an introduction to the theory of condenser capacities in the plane, the monotonicity of the capacity under various special transformations (polarization, Gonchar transformation, averaging transformations and others) is established, followed by various types of symmetrization which are one of the main objects of the book. By using symmetrization principles, some metric properties of compact sets are obtained and some extremal decomposition problems are solved. Moreover, the classical and present facts for univalent and multivalent meromorphic functions are proven. This book will be a valuable source for current and future researchers in various branches of complex analysis and potential theory.

Fonctions spéciales

Charles F. Dunkl, Yuan Xu. — **Orthogonal polynomials of several variables**. — Second edition. — Encyclopedia of mathematics and its applications, vol. 155. — Un vol. relié, 16×24, de XVII, 420 p. — ISBN 978-1-107-07189-6. — Prix: £80.00. — Cambridge University Press, Cambridge, 2014.

Serving both as an introduction to the subject and as a reference, this book presents the theory in elegant form and with modern concepts and notation. It covers the general theory and emphasizes the classical types of orthogonal polynomials whose weight functions are supported on standard domains. The approach is a blend of classical analysis and symmetry group theoretic methods. Finite reflection groups are used to motivate and classify symmetries of weight functions and the associated polynomials. This revised edition has been updated throughout to reflect recent developments in the field. It contains 25 % new material, including two brand new chapters on orthogonal polynomials in two variables, which will be especially useful for applications, and orthogonal polynomials on the unit sphere. The most modern and complete treatment of the subject available, it will be useful to a wide audience of mathematicians and applied scientists, including physicists, chemists and engineers.

Équations aux dérivées partielles

Benedict Baur. — **Elliptic boundary value problems and construction of L^p-strong Feller processes with singular drift and reflection**. — Research. — Un vol. broché, 15×21, de X, 198 p. — ISBN 978-3-658-05828-9. — Prix: €69.00. — Springer Spektrum, Wiesbaden, 2014.

Benedict Baur presents modern functional analytic methods for construction and analysis of Feller processes in general and diffusion processes in particular. Topics covered are: Construction of L^p-strong Feller processes using Dirichlet form methods, regularity for solutions of elliptic boundary value problems, construction of elliptic diffusions with singular drift and reflection, Skorokhod decomposition and applications

to mathematical physics like finite particle systems with singular interaction. Emphasize is placed on the handling of singular drift coefficients, as well as on the discussion of point wise and path wise properties of the constructed processes rather than just the quasi-everywhere properties commonly known from the general Dirichlet form theory. Contents: Construction of Lp-strong Feller processes. – Elliptic boundary value problems. – Skorokhod decomposition for reflected diffusions with singular drifts. – Particle systems with singular interaction.

Gadi Fibich. — **The nonlinear Schrödinger equation: singular solutions and optical collapse**. — Applied mathematical sciences, vol. 192. — Un vol. relié, 16×24, de XXXI, 862 p. — ISBN 978-3-319-12747-7. — Prix: SFr. 106.50. — Springer, Cham, 2015.

This book is an interdisciplinary introduction to optical collapse of laser beams, which is modelled by singular (blow-up) solutions of the nonlinear Schrödinger equation. With great care and detail, it develops the subject including the mathematical and physical background and the history of the subject. It combines rigorous analysis, asymptotic analysis, informal arguments, numerical simulations, physical modelling, and physical experiments. It repeatedly emphasizes the relations between these approaches, and the intuition behind the results. *The nonlinear Schrödinger equation* will be useful to graduate students and researchers in applied mathematics who are interested in singular solutions of partial differential equations, nonlinear optics and nonlinear waves, and to graduate students and researchers in physics and engineering who are interested in nonlinear optics and Bose-Einstein condensates. It can be used for courses on partial differential equations, nonlinear waves, and nonlinear optics. Gadi Fibich is a professor of applied mathematics at Tel Aviv University.

Björn Gustafsson, Razvan Teodorescu, Alexander Vasil'ev. — **Classical and stochastic Laplacian growth**. — Advances in mathematical fluid mechanics. — Un vol. relié, 16,5×24, de XIV, 317 p. — ISBN 978-3-319-08286-8. — Prix: SFr. 126.50. — Springer, Cham, 2015.

This monograph covers a multitude of concepts, results, and research topics originating from a classical moving-boundary problem in two dimensions (idealized Hele-Shaw flows, or classical Laplacian growth), which has strong connections to many exciting modern developments in mathematics and theoretical physics. Of particular interest are the relations between Laplacian growth and the infinite-size limit of ensembles of random matrices with complex eigenvalues; integrable hierarchies of differential equations and their spectral curves; classical and stochastic Löwner evolution and critical phenomena in two-dimensional statistical models; weak solutions of hyperbolic partial differential equations of singular-perturbation type; and resolution of singularities for compact Riemann surfaces with anti-holomorphic involution. The book also provides an abundance of exact classical solutions, many explicit examples of dynamics by conformal mapping as well as a solid foundation of potential theory. An extensive bibliography covering over twelve decades of results and an introduction rich in historical and biographical details complement the eight main chapters of this monograph. Given its systematic and consistent notation and background results, this book provides a self-contained resource. It is accessible to a wide readership, from beginner graduate students to researchers from various fields in natural sciences and mathematics.

Systèmes dynamiques et théorie ergodique

Ulrich Krause. — **Positive dynamical systems in discrete time: theory, models, and applications**. — De Gruyter studies in mathematics, vol. 62. — Un vol. relié, 17,5×24,5, de XV, 348 p. — ISBN 978-3-11-036975-5. — Prix: €119.95. — De Gruyter, Berlin, 2015.

This is the first comprehensive treatment of positive dynamical systems in discrete time. Positive systems have applications in a great variety of fields, ranging from biology and physics over computer and engineering sciences to economics and sociology. The book develops the mathematical framework for positive systems, with nonlinear systems at the center, in a systematic, self-contained and rigorous manner. It can serve as a monograph for researchers in mathematics as well as for scientists of other areas and is suitable also as a textbook for graduate students. Each chapter contains a bibliography, motivating examples and numerous exercises. The book treats in particular the following topics: An extension of the

classical Perron-Frobenius theory of positive matrices from linear to concave mappings. – Convex cones in topological vector spaces and internal metrics as Hilbert's projective metric, the Thompson metric and others. – Nonlinear selfmappings of cones, contractive for internal metrics, their iteration, eigenvalues, fixed points. – The fundamental phenomenon of limit set trichotomy in positive dynamical systems with applications to nonlinear difference and differential equations. – An extension of the stability properties of inhomogeneous Markov chains to nonlinear and nonautonomous positive systems. – The dynamics of interaction within networks, including multi-agent systems, opinion dynamics, swarms.

Analyse de Fourier, analyse harmonique abstraite

Loukas Grafakos. — **Modern Fourier analysis**. — Graduate texts in mathematics, vol. 250. — Un vol. relié, 16×24, de XVI, 624 p. — ISBN 978-1-4939-1229-2. — Prix: US$69.99. — Springer, New York, 2014.

This text is addressed to graduate students in mathematics and to interested researchers who wish to acquire an in depth understanding of Euclidean harmonic analysis. The text covers modern topics and techniques in function spaces, atomic decompositions, singular integrals of nonconvolution type and the boundedness and convergence of Fourier series and integrals. The exposition and style are designed to stimulate further study and promote research. Historical information and references are included at the end of each chapter. This third edition includes a new chapter entitled "Multilinear harmonic analysis" which focuses on topics related to multilinear operators and their applications. Sections 1.1 and 1.2 are also new in this edition. Numerous corrections have been made to the text from the previous editions and several improvements have been incorporated, such as the adoption of clear and elegant statements. A few more exercises have been added with relevant hints when necessary.

Analyse fonctionnelle

Miguel Cabrera García, Ángel Rodríguez Palacios. — **Non-associative normed algebras. Volume 1: the Vidav-Palmer and Gelfand-Naimark theorems**. — Encyclopedia of mathematics and its applications, vol. 154. — Un vol. relié, 16×24, de XXII, 712 p. — ISBN 978-1-107-04306-0. — Prix: £99.00. — Cambridge University Press, Cambridge, 2014.

This first systematic account of the basic theory of normed algebras, without assuming associativity, includes many new and unpublished results and is sure to become a central resource for researchers and graduate students in the field. This first volume focuses on the non-associative generalizations of (associative) C*-algebras provided by the so-called non-associative Gelfand-Naimark and Vidav-Palmer theorems, which give rise to alternative C*-algebras and non-commutative JB*-algebras, respectively. The relationship between non-commutative JB*-algebras and JB*-triples is also fully discussed. The second volume covers Zel'manov's celebrated work in Jordan theory to derive classification theorems for non-commutative JB*-algebras and JB*-triples, as well as other topics. The book interweaves pure algebra, geometry of normed spaces, and complex analysis, and includes a wealth of historical comments, background material, examples and exercises. The authors also provide an extensive bibliography.

Juha Heinonen, Pekka Koskela, Nageswari Shanmugalingam, Jeremy T. Tyson. — **Sobolev spaces on metric measure spaces : an approach based on upper gradients**. — New mathematical monographs, vol. 27. — Un vol. relié, 16×23,5, de XII, 434 p. — ISBN 978-1-107-09234-1. — Prix: £80.00. — Cambridge University Press, Cambridge, 2015.

Analysis on metric spaces emerged in the 1990s as an independent research field providing a unified treatment of first-order analysis in diverse and potentially nonsmooth settings. Based on the fundamental concept of upper gradient, the notion of a Sobolev function was formulated in the setting of metric measure spaces supporting a Poincaré inequality. This coherent treatment from first principles is an ideal introduction to the subject for graduate students and a useful reference for experts. It presents the foundations of the theory

of such first-order Sobolev spaces, then explores geometric implications of the critical Poincaré inequality, and indicates numerous examples of spaces satisfying this axiom. A distinguishing feature of the book is its focus on vector-valued Sobolev spaces. The final chapters include proofs of several landmark theorems, including Cheeger's stability theorem for Poincaré inequalities under Gromov-Hausdorff convergence, and the Keith–Zhong self-improvement theorem for Poincaré inequalities.

Théorie des opérateurs

Francesco Altomare, Mirella Cappelletti Montano, Vita Leonessa, Ioan Raşa. — **Markov operators, positive semigroups and approximation processes**. — De Gruyter studies in mathematics, vol. 61. — Un vol. relié, 17,5×24,5, de XI, 313 p. — ISBN 978-3-11-037274-8. — Prix: €129.95. — De Gruyter, Berlin, 2014.

This research monograph gives a detailed account of a theory which is mainly concerned with certain classes of degenerate differential operators, Markov semigroups and approximation processes. These mathematical objects are generated by arbitrary Markov operators acting on spaces of continuous functions defined on compact convex sets; the study of the interrelations between them constitutes one of the distinguishing features of the book. Among other things, this theory provides useful tools for studying large classes of initial-boundary value evolution problems, the main aim being to obtain a constructive approximation to the associated positive C0-semigroups by means of iterates of suitable positive approximating operators. As a consequence, a qualitative analysis of the solutions to the evolution problems can be efficiently developed. The book is mainly addressed to research mathematicians interested in modern approximation theory by positive linear operators and/or in the theory of positive C0-semigroups of operators and evolution equations. It could also serve as a textbook for a graduate level course.

Géométrie différentielle

Tevian Dray. — **Differential forms and the geometry of general relativity**. — Un vol. relié, 16×24, de XXV, 295 p. — ISBN 978-1-4665-1000-5. — Prix: US$49.95. — CRC Press, Boca Raton, 2015.

Differential forms and the geometry of general relativity provides readers with a coherent path to understanding relativity. Requiring little more than calculus and some linear algebra, it helps readers learn just enough differential geometry to grasp the basics of general relativity. The book contains two intertwined but distinct halves. Designed for advanced undergraduate or beginning graduate students in mathematics or physics, most of the text requires little more than familiarity with calculus and linear algebra. The first half presents an introduction to general relativity that describes some of the surprising implications of relativity without introducing more formalism than necessary. This nonstandard approach uses differential forms rather than tensor calculus and minimizes the use of "index gymnastics" as much as possible. The second half of the book takes a more detailed look at the mathematics of differential forms. It covers the theory behind the mathematics used in the first half by emphasizing a conceptual understanding instead of formal proofs. The book provides a language to describe curvature, the key geometric idea in general relativity.

Andrey Popov. — **Lobachevsky geometry and modern nonlinear problems**. — Translated by Andrei Iacob. — Un vol. relié, 16×24, de VIII, 310 p. — ISBN 978-3-319-05668-5. — Prix: SFr. 126.50. — Springer / Birkhäuser, Cham, 2014.

This monograph presents the basic concepts of hyperbolic Lobachevsky geometry and their possible applications to modern nonlinear applied problems in mathematics and physics, summarizing the findings of roughly the last hundred years. The central sections cover the classical building blocks of hyperbolic Lobachevsky geometry, pseudo spherical surfaces theory, net geometrical investigative techniques of nonlinear differential equations in partial derivatives, and their applications to the analysis of the physical models. As the sine-Gordon equation appears to have profound "geometrical roots" and numerous applications to modern nonlinear problems, it is treated as a universal "object" of investigation, connecting many of the

problems discussed. The aim of this book is to form a general geometrical view on the different problems of modern mathematics, physics and natural science in general in the context of non-Euclidean hyperbolic geometry.

Probabilités et processus stochastiques

David Applebaum. — **Probability on compact Lie groups**. — Foreword by Herbert Heyer. — Probability theory and stochastic modelling, vol. 70. — Un vol. relié, 16×24, de XXVI, 217 p. — ISBN 978-3-319-07841-0. — Prix: SFr. 93.50. — Springer, Cham, 2014.

Probability theory on compact Lie groups deals with the interaction between "chance" and "symmetry," a beautiful area of mathematics of great interest in its own sake but which is now also finding increasing applications in statistics and engineering (particularly with respect to signal processing). The author gives a comprehensive introduction to some of the principle areas of study, with an emphasis on applicability. The most important topics presented are: the study of measures via the non-commutative Fourier transform, existence and regularity of densities, properties of random walks and convolution semigroups of measures, and the statistical problem of deconvolution. The emphasis on compact (rather than general) Lie groups helps readers to get acquainted with what is widely seen as a difficult field but which is also justified by the wealth of interesting results at this level and the importance of these groups for applications.

The book is primarily aimed at researchers working in probability, stochastic analysis and harmonic analysis on groups. It will also be of interest to mathematicians working in Lie theory and physicists, statisticians and engineers who are working on related applications. A background in first year graduate level measure theoretic probability and functional analysis is essential; a background in Lie groups and representation theory is certainly helpful but the first two chapters also offer orientation in these subjects.

Oleg Klesov. — **Limit theorems for multi-indexed sums of random variables**. — Probability theory and stochastic modelling, vol. 71. — Un vol. relié, 16×24, de XVIII, 483 p. — ISBN 978-3-662-44387-3. — Prix: €100.00. — Springer, Berlin, 2014.

Presenting the first unified treatment of limit theorems for multiple sums of independent random variables, this volume fills an important gap in the field. Several new results are introduced, even in the classical setting, as well as some new approaches that are simpler than those already established in the literature. In particular, new proofs of the strong law of large numbers and the Hajek–Renyi inequality are detailed. Applications of the described theory include Gibbs fields, spin glasses, polymer models, image analysis and random shapes. Limit theorems form the backbone of probability theory and statistical theory alike. The theory of multiple sums of random variables is a direct generalization of the classical study of limit theorems, whose importance and wide application in science is unquestionable. However, to date, the subject of multiple sums has only been treated in journals. The results described in this book will be of interest to advanced undergraduates, graduate students and researchers who work on limit theorems in probability theory, the statistical analysis of random fields, as well as in the field of random sets or stochastic geometry. The central topic is also important for statistical theory, developing statistical inferences for random fields, and also has applications to the sciences, including physics and chemistry.

Kazuaki Taira. — **Semigroups, boundary value problems and Markov processes**. — Second edition. — Springer monographs in mathematics. — Un vol. relié, 16×24, de XIX, 716 p. — ISBN 978-3-662-43695-0. — Prix: SFr. 146.50. — Springer, Heidelberg, 2014.

A careful and accessible exposition of functional analytic methods in stochastic analysis is provided in this book. It focuses on the interrelationship between three subjects in analysis: Markov processes, semi groups and elliptic boundary value problems. The author studies a general class of elliptic boundary value problems for second-order, Waldenfels integro-differential operators in partial differential equations and proves that this class of elliptic boundary value problems provides a general class of Feller semigroups in functional analysis. As an application, the author constructs a general class of Markov processes in probability in which a Markovian particle moves both by jumps and continuously in the state space until it 'dies' at the time when it reaches the set where the particle is definitely absorbed. Augmenting the first

edition published in 2004, this edition includes four new chapters and eight re-worked and expanded chapters. It is amply illustrated and all chapters are rounded off with notes and comments where bibliographical references are primarily discussed. Thanks to the kind feedback from many readers, some errors in the first edition have been corrected. In order to keep the book up-to-date, new references have been added to the bibliography. Researchers and graduate students interested in PDEs, functional analysis and probability will find this volume useful.

Mathukumalli Vidyasagar. — **Hidden Markov processes: theory and applications to biology**. — Princeton series in applied mathematics. — Un vol. broché, 16×24, de XIV, 287 p. — ISBN 978-0-691-13315-7. — Prix: £41.95. — Princeton University Press, Princeton, 2014.

This book explores important aspects of Markov and hidden Markov processes and the applications of these ideas to various problems in computational biology. The book starts from first principles, so that no previous knowledge of probability is necessary. However, the work is rigorous and mathematical, making it useful to engineers and mathematicians, even those not interested in biological applications. A range of exercises is provided, including drills to familiarize the reader with concepts and more advanced problems that require deep thinking about the theory. Biological applications are taken from post-genomic biology, especially genomics and proteomics. The topics examined include standard material such as the Perron-Frobenius theorem, transient and recurrent states, hitting probabilities and hitting times, maximum likelihood estimation, the Viterbi algorithm, and the Baum-Welch algorithm. The book contains discussions of extremely useful topics not usually seen at the basic level, such as ergodicity of Markov processes, Markov Chain Monte Carlo (MCMC), information theory, and large deviation theory for both i.i.d and Markov processes. The book also presents state-of-the-art realization theory for hidden Markov models. Among biological applications, it offers an in-depth look at the BLAST (Basic Local Alignment Search Technique) algorithm, including a comprehensive explanation of the underlying theory. Other applications such as profile hidden Markov models are also explored.

Informatique

Tamara Munzner. — **Visualization analysis & design**. — A.K. Peters visualization series. — Un vol. relié, 19,5×24, de XXIII, 404 p. — ISBN 978-1-4665-0891-0. — Prix: US$39.95. — CRC Press, Boca Raton, 2015.

Visualization analysis and design provides a systematic, comprehensive framework for thinking about visualization in terms of principles and design choices. The book features a unified approach encompassing information visualization techniques for abstract data, scientific visualization techniques for spatial data, and visual analytics techniques for interweaving data transformation and analysis with interactive visual exploration. It emphasizes the careful validation of effectiveness and the consideration of function before form. The book breaks down visualization design according to three questions: what data users need to see, why users need to carry out their tasks, and how the visual representations proposed can be constructed and manipulated. It walks readers through the use of space and color to visually encode data in a view, the trade-offs between changing a single view and using multiple linked views, and the ways to reduce the amount of data shown in each view. The book concludes with six case studies analyzed in detail with the full framework. The book is suitable for a broad set of readers, from beginners to more experienced visualization designers. It does not assume any previous experience in programming, mathematics, human-computer interaction, or graphic design and can be used in an introductory visualization course at the graduate or undergraduate level.

Mécanique des particules et systèmes

Vieri Benci, Donato Fortunato. — **Variational methods in nonlinear field equations : solitary waves, hylomorphic solitons and vortices**. — Springer monographs in mathematics. — Un vol. relié, 16×24, de XVII, 250 p. — ISBN 978-3-319-06913-5. — Prix: SFr. 113.50. — Springer, Cham, 2014.

The book analyzes the existence of solitons, namely of finite energy solutions of field equations which

exhibit stability properties. The book is divided in two parts. In the first part, the authors give an abstract definition of solitary wave and soliton and we develop an abstract existence theory for hylomorphic solitons, namely for those solitons which minimize the energy for a given charge. In the second part, the authors apply this theory to prove the existence of hylomorphic solitons for some classes of field equations (nonlinear Klein-Gordon-Maxwell equations, nonlinear Schrödinger–Maxwell equations, nonlinear beam equation ...). The abstract theory is sufficiently flexible to be applied to other situations, like the existence of vortices. The books is addressed to mathematicians and physicists.

Franco Cardin. — **Elementary symplectic topology and mechanics**. — Lecture notes of the Unione Matematica Italiana, vol. 16. — Un vol. broché, 15,5×23,5, de XVII, 222 p. — ISBN 978-3-319-11025-7. — Prix: SFr. 53.50. — Springer, Cham, 2015.

This is a short tract on the essentials of differential and symplectic geometry together with a basic introduction to several applications of this rich framework: analytical mechanics, the calculus of variations, conjugate points & Morse index, and other physical topics. A central feature is the systematic utilization of Lagrangian submanifolds and their Maslov–Hörmander generating functions. Following this line of thought, first introduced by Wlodemierz Tulczyjew, geometric solutions of Hamilton-Jacobi equations, Hamiltonian vector fields and canonical transformations are described by suitable Lagrangian submanifolds belonging to distinct well-defined symplectic structures. This unified point of view has been particularly fruitful in symplectic topology, which is the modern Hamiltonian environment for the calculus of variations, yielding sharp sufficient existence conditions. This line of investigation was initiated by Claude Viterbo in 1992; here, some primary consequences of this theory are exposed in Chapter 8: aspects of Poincaré's last geometric theorem and the Arnold's conjecture are introduced. In Chapter 7 elements of the global asymptotic treatment of the highly oscillating integrals for the Schrödinger equation are discussed: as is well known, this eventually leads to the theory of Fourier integral operators. This short handbook is directed toward graduate students in mathematics and physics and to all those who desire a quick introduction to these beautiful subjects.

Mécanique des fluides, acoustique

Sergey D. Algazin, Igor A. Kijko. — **Aeroelastic vibrations and stability of plates and shells**. — De Gruyter studies in mathematical physics, vol. 25. — Un vol. relié, 17×24,5, de XI, 220 p. — ISBN 978-3-11-033836-2. — Prix: €169.95. — De Gruyter, Berlin, 2015.

Back-action of aerodynamics onto structures such as wings cause vibrations and may resonantly couple to them, thus causing instabilities (flutter) and endangering the whole structure. By careful choices of geometry, materials and damping mechanisms, hazardous effects on wind engines, planes, turbines and cars can be avoided. Besides an introduction into the problem of flutter, new formulations of flutter problems are given as well as a treatise of supersonic flutter and of a whole range of mechanical effects. Numerical and analytical methods to study them are developed and applied to the analysis of new classes of flutter problems for plates and shallow shells of arbitrary plane form. Specific problems discussed in the book in the context of numerical simulations are supplemented by Fortran code examples (available on the website).

Physique statistique, structure de la matière

Timothy D. Andersen, Chjan C. Lim. — **Introduction to vortex filaments in equilibrium**. — Springer monographs in mathematics. — Un vol. relié, 16×24, de XI, 139 p. — ISBN 978-1-4939-1937-6. — Prix: US$69.99. — Springer, New York, 2014.

This book presents fundamental concepts and seminal results to the study of vortex filaments in equilibrium. It also presents new discoveries in quasi-2D vortex structures with applications to geophysical fluid dynamics and magnetohydrodynamics in plasmas. It fills a gap in the vortex statistics literature by simplifying the mathematical introduction to this complex topic, covering numerical methods, and exploring a wide range of applications with numerous examples. The authors have produced an introduction that

is clear and easy to read, leading the reader step-by-step into this topical area. Alongside the theoretical concepts and mathematical formulations, interesting applications are discussed. This combination makes the text useful for students and researchers in mathematics and physics.

Relativité

Farook Rahaman. — **The special theory of relativity: a mathematical approach**. — Un vol. relié, 16×24, de XV, 249 p. — ISBN 978-81-322-2079-4. — Prix: US$69.99. — Springer, New Delhi, 2014.

The book expounds the major topics in the special theory of relativity. It provides a detailed examination of the mathematical foundation of the special theory of relativity, relativistic mass, relativistic mechanics and relativistic electrodynamics. As well as covariant formulation of relativistic mechanics and electrodynamics, the book discusses the relativistic effect on photons. Using a mathematical approach, the text offers graduate students a clear, concise view of the special theory of relativity. Organized into 14 chapters and two appendices, the content is presented in a logical order, and every topic has been dealt with in a simple and lucid manner. To aid understanding of the subject, the book provides numerous relevant worked examples in every chapter. The book's mathematical approach helps students in their independent study and motivates them to research the topic further.

Carlo Rovelli, (Editor). — **General relativity: the most beautiful of theories: Applications and trends after 100 years**. — De Gruyter studies in mathematical physics, vol. 28. — Un vol. relié, 17,5×24,5, de VIII, 208 p. — ISBN 978-3-11-034042-6. — Prix: €99.95. — De Gruyter, Berlin, 2015.

Generalising Newton's law of gravitation, general relativity is one of the pillars of modern physics. While applications in the beginning were restricted to isolated effects such as a proper understanding of Mercury's orbit, the second half of the twentieth century saw a massive development of applications. These include cosmology, gravitational waves, and even very practical results for satellite based positioning systems as well as different approaches to unite general relativity with another very successful branch of physics - quantum theory. On the occasion of general relativity's centennial, leading scientists in the different branches of gravitational research review the history and recent advances in the main fields of applications of the theory, which was referred to by Lev Landau as "the most beautiful of the existing physical theories".

Yoshiaki Tanii. — **Introduction to supergravity**. — Springer briefs in mathematical physics, vol. 1. — Un vol. broché, 15,5×23,5, de IX, 130 p. — ISBN 978-4-431-54827-0. — Prix: US$54.99. — Springer, Tokyo, 2014.

This book is a pedagogical introduction to supergravity, a gravitational field theory that includes supersymmetry (symmetry between bosons and fermions) and is a generalization of Einstein's general relativity. Supergravity provides a low-energy effective theory of superstring theory, which has attracted much attention as a candidate for the unified theory of fundamental particles, and it is a useful tool for studying non-perturbative properties of superstring theory such as D-branes and string duality. This work considers classical supergravities in four and higher spacetime dimensions with their applications to superstring theory in mind. More concretely, it discusses classical Lagrangians (or field equations) and symmetry properties of supergravities. Besides local symmetries, supergravities often have global non-compact symmetries, which play a crucial role in their applications to superstring theory. One of the main features of this book is its detailed discussion of these non-compact symmetries. The aim of the book is twofold. One is to explain the basic ideas of supergravity to those who are not familiar with it. Toward that end, the discussions are made both pedagogical and concrete by stating equations explicitly. The other is to collect relevant formulae in one place so as to be useful for applications to string theory. The subjects discussed in this book include the vielbein formulation of gravity, supergravities in four dimensions, possible types of spinors in various dimensions, superalgebras and supermultiplets, non-linear sigma models for non-compact Lie groups, electric-magnetic duality symmetries, supergravities in higher dimensions, dimensional reductions, and gauged and massive supergravities.

Économie, recherche opérationnelle, jeux

Richard J. Nowakowski, (Editor). — **Games of no chance 4**. — Mathematical Sciences Research Institute publications, vol. 63. — Un vol. relié, 16×24, de X, 339 p. — ISBN 978-1-107-01103-8. — Prix: £59.00. — Cambridge University Press, New York, 2015.

Combinatorial games are the strategy games that people like to play, for example Chess, Hex, and Go. They differ from economic games in that there are two players who play alternately with no hidden cards and no dice. These games have a mathematical structure that allows players to analyse them in the abstract. *Games of no chance 4* contains the first comprehensive explorations of misère (last player to move loses) games, extends the theory for some classes of normal-play (last player to move wins) games and extends the analysis for some specific games. It includes a tutorial for the very successful approach to analysing misère impartial games and the first attempt at using it for misère partisan games. Hex and Go are featured, as well as new games: Toppling Dominoes and Maze. Updated versions of *Unsolved problems in combinatorial game theory* and the *Combinatorial games bibliography* complete the volume.