Bulletin bibliographique

Extrait de *L'Enseignement Mathématique* (2) 62 (2016), fasc. 3–4

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Généralités

Ron Aharoni. — **Circularity : a common secret to paradoxes, scientific revolutions and humor**. — Un vol. broché, 17×24,5, de XIII, 165 p. — ISBN 978-981-4723-68-8. — Prix : £23.00. — World Scientific, Singapour, 2016.

"Circularity" is the story of a Janus-faced conceptual structure, that on the one hand led to deep scientific discoveries, and on the other hand is used to trick the mind into believing the impossible. Alongside mathematical revolutions that eventually led to the invention of the computer, the book describes ancient paradoxes that arise from circular thinking. Another aspect of circularity, its ability to entertain, leads to a surprising insight on the time old question "What is humor". The book presents the ubiquity of circularity in many fields, and its power to confuse and to instruct.

Jacques Belair, Ian A. Frigaard, Herb Kunze, Roman Makarov, Roderick Melnik, Raymond J. Spiteri, (Editors). — **Mathematical and computational approaches in advancing modern science and engineering**. — Un vol. relié, 16×24, de XV, 806 p. — ISBN 978-3-319-30377-2. — Prix : €171.59. — Springer, Switzerland, 2016.

Focusing on five main groups of interdisciplinary problems, this book covers a wide range of topics in mathematical modeling, computational science and applied mathematics. It presents a wealth of new results in the development of modeling theories and methods, advancing diverse areas of applications and promoting interdisciplinary interactions between mathematicians, scientists, engineers and representatives from other disciplines. The book offers a valuable source of methods, ideas, and tools developed for a variety of disciplines, including the natural and social sciences, medicine, engineering, and technology. Original results are presented on both the fundamental and applied level, accompanied by an ample number of real-world problems and examples emphasizing the interdisciplinary nature and universality of mathematical modeling, and providing an excellent outline of today's challenges. Mathematical modeling, with applied and computational methods and tools, plays a fundamental role in modern science and engineering. It provides a primary and ubiquitous tool in the context making new discoveries, as well as in the development of new theories and techniques for solving key problems arising in scientific and engineering applications. The contributions, which are the product of two highly successful meetings held jointly in Waterloo, Ontario, Canada on the main campus of Wilfrid Laurier University in June 2015, i.e., the International Conference on Applied Mathematics, Modeling and Computational Science, and the Annual Meeting of the Canadian Applied and Industrial Mathematics (CAIMS), make the book a valuable resource for any reader interested in a broader overview of the methods, ideas and tools involved in mathematical and computational approaches developed for other disciplines, including the natural and social sciences, engineering and technology.

Jérôme Cottanceau. — **Le choix du meilleur urinoir**. — Science à plumes. — Un vol. broché, 15×22, de 216 p. — ISBN 978-2-7011-9766-1. — Prix : €19.00. — Belin, Paris, 2016.

Voici le seul livre qui vous permettra de gagner (ou pas) à Roland Garros et au Monopoly, grâce aux maths ! Que l'on soit mathématicien, professeur, étudiant ou encore parent d'élève, on est forcément confronté un jour à LA grande question : « Mais à quoi ça sert, les maths ? » Ceux qui tentent d'y répondre

se scindent en deux groupes. L'un vous explique que les mathématiques servent à construire des ponts, fabriquer des téléphones ou aller dans l'espace. L'autre qu'elles sont une construction esthétique ou un jeu de l'esprit. Mais aucun ne propose de réponse véritablement satisfaisante. Avec un brin de mauvaise foi, beaucoup de second degré et un art du coq à l'âne consommé, Jérôme Cottanceau, alias ElJj, nous montre enfin à quoi servent concrètement les maths dans notre vie quotidienne. Par exemple à couper un gâteau bien comme il faut, à connaître le nombre de blagues Carambar différentes, à carreler avec art sa salle de bains et accrocher ses tableaux au mur, à connaître la forme de la Terre ou choisir son secrétaire, à sortir d'un labyrinthe et, bien sûr, à choisir le meilleur urinoir ! En 20 exemples tirés de l'histoire des mathématiques, accessibles au plus grand nombre, il démontre ainsi que les maths servent aussi et avant tout à fabriquer des réponses à la question : « Mais à quoi ça sert, les maths ? »

Paul Curzon, Peter W. Mcowan. — **The power of computational thinking: games, magic and puzzles to help you become a computational thinker**. — Un vol. broché, 15×23, de V, 216 p. — ISBN 978-1-78634-184-6. — Prix: £20.00. — World Scientific, New Jersey, 2017.

Computational thinking has changed the way we all live, work and play. It has changed the way science is done too; won wars, created whole new industries and saved lives. It is at the heart of computer programming and is a powerful approach to problem solving, with or without computers. It is so important that many countries now require that primary school children learn the skills. Professors Paul Curzon and Peter McOwan of Queen Mary University of London have written a unique and enjoyable introduction. They describe the elements of computational thinking — such as algorithmic thinking, decomposition, abstraction and pattern matching — in an entertaining and accessible way, using magic tricks, games and puzzles, as well as through real and challenging problems that computer scientists work on. This book gives you a head start in learning the skills needed for coding, and will improve your real life problem solving skills. It will help you design and evaluate new technologies, as well as understand both your own brain and the digital world in a deeper way.

Jean-Paul Delahaye. — **Mathématiques et mystères**. — Bibliothèque scientifique. — Un vol. broché, 18,5×24,5, de 191 p. — ISBN 978-2-410-00236-2. — Prix : €24.00. — Belin, Paris, 2016.

Les mathématiques sont une double source de mystères. D'une part, elles se posent de nombreuses questions qu'elles ne réussissent pas à résoudre ou qu'elles résolvent de manière partielle : énigmes résistantes à toutes les attaques, objets ou situations aux propriétés bizarres, paradoxes … D'autre part, les mathématiques créent de l'inconnu, car elles inventent des méthodes engendrant à la demande des « mystères parfaits » : ce sont les codes secrets, et plus généralement les merveilles de la cryptographie moderne. Ce livre vous propose de vous révéler quelques arcanes de ces mystères. Comment prouver que l'on connaît un secret sans le révéler ? La beauté se met-elle en formules ? Peut-on poser à plat une table de pique-nique carrée en toutes circonstances ? Un être omniscient est-il possible d'un point de vue logique ? Et un être omnipotent ? Comment expliquer le succès du Bitcoin, une monnaie cryptographique qui vaut aujourd'hui l'équivalent de plusieurs milliards d'euros ? Un humain est-il capable de placer un point dans une figure « au hasard » ? Qu'est-ce qu'une équation impossible ? Autant de sujets déconcertants et passionnants que les chercheurs explorent, pour le simple plaisir de se confronter à la magie des choses formelles et logiques … ou parce que c'est utile ! Composés à partir d'articles de la rubrique « Logique et calcul » qui paraît chaque mois dans la revue Pour la science, les 22 chapitres de ce livre vous feront découvrir différentes facettes de cette aventure jamais interrompue des mathématiques. À vous de parcourir à votre guise ce petit panorama des mystères de la discipline, dans l'ordre ou dans le désordre … et de rejoindre le petit groupe des initiés !

Michel Marie Deza, Elena Deza. — **Encyclopedia of distances**. — Fourth edition. — Un vol. relié, 16×24, de XXII, 756 p. — ISBN 978-3-662-52843-3. — Prix: €174.06. — Springer, Berlin, 2016.

This 4-th edition of the leading reference volume on distance metrics is characterized by updated and rewritten sections on some items suggested by experts and readers, as well a general streamlining of content and the addition of essential new topics. Though the structure remains unchanged, the new edition also explores recent advances in the use of distances and metrics for, e.g., generalized distances, probability theory, graph theory, coding theory, data analysis. New topics in the purely mathematical sections include, e.g.,

the Vitanyi multiset-metric, algebraic point-conic distance, triangular ratio metric, Rossi-Hamming metric, Taneja distance, spectral semimetric between graphs, channel metrization, and Maryland bridge distance. The multidisciplinary sections have also been supplemented with new topics, including: dynamic time wrapping distance, memory distance, allometry, atmospheric depth, elliptic orbit distance, VLBI distance measurements, the astronomical system of units, and walkability distance. Leaving aside the practical questions that arise during the selection of a 'good' distance function, this work focuses on providing the research community with an invaluable comprehensive listing of the main available distances. As well as providing standalone introductions and definitions, the encyclopedia facilitates swift cross-referencing with easily navigable bold-faced textual links to core entries. In addition to distances themselves, the authors have collated numerous fascinating curiosities in their Who's Who of metrics, including distance-related notions and paradigms that enable applied mathematicians in other sectors to deploy research tools that non-specialists justly view as arcane. In expanding access to these techniques, and in many cases enriching the context of distances themselves, this peerless volume is certain to stimulate fresh research.

Emil Makovicky. — **Symmetry: through the eyes of old masters**. — Un vol. relié, 17,5×24,5, de XIX, 240 p. — ISBN 978-3-11-041705-0. — Prix: €99.95. — De Gruyter, Berlin/Boston, 2016.

A large range of symmetries in art is presented through clear and aesthetically outstanding examples of historical ornaments. Compendious comments illustrate the selected photographic material by addressing the interested and specialist reader alike. Broad selection of symmetry in art, composed by an internationally renowned specialist, concise explanations in a scientific and yet understandable language.

Liz Mcmahon, Gary Gordon, Hannah Gordon, Rebecca Gordon. — **The joy of set: the many mathematical dimensions of a seemingly simple card game**. — Un vol. relié, 16×24, de XII, 306 p. — ISBN 978-0-691-16614-8. — Prix: €32.36. — Princeton University Press, Princeton/Oxford, National museum of mathematics, New York, 2017.

Have you ever played the addictive card game SET? Have you ever wondered about the connections between games and mathematics? If the answer to either question is "yes," then *The Joy of SET* is the book for you! *The Joy of SET* takes readers on a fascinating journey into this seemingly simple card game and reveals its surprisingly deep and diverse mathematical dimensions. Absolutely no mathematical background is necessary to enjoy this book — all you need is a sense of curiosity and adventure! Originally invented in 1974 by Marsha Falco and officially released in 1991, SET has gained a widespread, loyal following. SET's eighty-one cards consist of one, two, or three symbols of different shapes (diamond, oval, squiggle), shadings (solid, striped, open), and colors (green, purple, red). In order to win, players must identify "sets" of three cards for which each characteristic is the same — or different — on all the cards. SET's strategic and unique design opens connections to a plethora of mathematical disciplines, including geometry, modular arithmetic, combinatorics, probability, linear algebra, and computer simulations. *The joy of set* looks at these areas as well as avenues for further mathematical exploration. As the authors show, the relationship between SET and mathematics runs in both directions — playing this game has generated new mathematics, and the math has led to new questions about the game itself. The first book devoted to the mathematics of one of today's most popular card games, *The Joy of SET* will entertain and enlighten the game enthusiast in all of us.

Logique et fondements

Dieter Probst, Peter Schuster, (Editors). — **Concepts of proof in mathematics, philosophy, and computer science**. — Ontos mathematical logic, vol. 6. — Un vol. relié, 16×23,5, de X, 374 p. — ISBN 978-1-5015-1080-9. — Prix: €109.95. — De Gruyter, Berlin/Boston, 2016.

A proof is a successful demonstration that a conclusion necessarily follows by logical reasoning from axioms which are considered evident for the given context and agreed upon by the community. It is this concept that sets mathematics apart from other disciplines and distinguishes it as the prototype of a deductive science. Proofs thus are utterly relevant for research, teaching and communication in mathematics and of particular interest for the philosophy of mathematics. In computer science, moreover, proofs have proved to

be a rich source for already certified algorithms. This book provides the reader with a collection of articles covering relevant current research topics circled around the concept 'proof'. It tries to give due consideration to the depth and breadth of the subject by discussing its philosophical and methodological aspects, addressing foundational issues induced by Hilbert's Programme and the benefits of the arising formal notions of proof, without neglecting reasoning in natural language proofs and applications in computer science such as program extraction.

Analyse combinatoire

Shaun Bullet, Tom Fearn, Frank Smith, (Editors). — **Algebra, logic and combinatorics**. — LTTC advanced mathematics series, vol. 3. — Un vol. broché, 15×23, de VII, 175 p. — ISBN 978-1-78634-030-6. — Prix: £32.00. — World Scientific, London, 2016.

This book leads readers from a basic foundation to an advanced level understanding of algebra, logic and combinatorics. Perfect for graduate or PhD mathematical-science students looking for help in understanding the fundamentals of the topic, it also explores more specific areas such as invariant theory of finite groups, model theory, and enumerative combinatorics. *Algebra, logic and combinatorics* is the third volume of the LTCC Advanced Mathematics Series. This series is the first to provide advanced introductions to mathematical science topics to advanced students of mathematics. Edited by the three joint heads of the London Taught Course Centre for PhD Students in the Mathematical Sciences (LTCC), each book supports readers in broadening their mathematical knowledge outside of their immediate research disciplines while also covering specialized key areas.

Josef Lauri, Raffaele Scapellato. — **Topics in graph automorphisms and reconstruction**. — Second edition. — London Mathematical Society lecture note series, vol. 432. — Un vol. relié, 16×24,5, de XIV, 192 p. — ISBN 978-1-316-61044-2. — Prix: £50.00. — Cambridge University Press, Cambridge, 2016.

This in-depth coverage of important areas of graph theory maintains a focus on symmetry properties of graphs. Standard topics on graph automorphisms are presented early on, while in later chapters more specialised topics are tackled, such as graphical regular representations and pseudosimilarity. The final four chapters are devoted to the reconstruction problem, and here special emphasis is given to those results that involve the symmetry of graphs, many of which are not to be found in other books. This second edition expands on several of the topics found in the first edition and includes both an enriched bibliography and a wide collection of exercises. Clearer proofs are provided, as are new examples of graphs with interesting symmetry properties. Any student who masters the contents of this book will be well prepared for current research in many aspects of the theory of graph automorphisms and the reconstruction problem.

Théorie des nombres

Jan-Hendrik Evertse, Kálmán Győry. — **Unit equations in Diophantine number theory**. — Cambridge studies in advanced mathematics, vol. 146. — Un vol. relié, 16×23,5, de XV, 363 p. — ISBN 978-1-107-09760-5. — Prix: £49.99. — Cambridge University Press, Cambridge, 2015.

Diophantine number theory is an active area that has seen tremendous growth over the past century, and in this theory unit equations play a central role. This comprehensive treatment is the first volume devoted to these equations. The authors gather together all the most important results and look at many different aspects, including effective results on unit equations over number fields, estimates on the number of solutions, analogues for function fields and effective results for unit equations over finitely generated domains. They also present a variety of applications. Introductory chapters provide the necessary background in algebraic number theory and function field theory, as well as an account of the required tools from Diophantine approximation and transcendence theory. This makes the book suitable for young researchers as well as experts who are looking for an up-to-date overview of the field.

David Masser. — **Auxiliary polynomials in number theory**. — Cambridge tracts in mathematics, vol. 207. — Un vol. relié, 16×23,5, de XVIII, 348 p. — ISBN 978-1-107-06157-6. — Prix: £89.99. — Cambridge University Press, Cambridge, 2016.

This unified account of various aspects of a powerful classical method, easy to understand in its simplest forms, is illustrated by applications in several areas of number theory. As well as including diophantine approximation and transcendence, which were mainly responsible for its invention, the author places the method in a broader context by exploring its application in other areas, such as exponential sums and counting problems in both finite fields and the field of rationals. Throughout the book, the method is explained in a 'molecular' fashion, where key ideas are introduced independently. Each application is the most elementary significant example of its kind and appears with detailed references to subsequent developments, making it accessible to advanced undergraduates as well as postgraduate students in number theory or related areas. It provides over 700 exercises both guiding and challenging, while the broad array of applications should interest professionals in fields from number theory to algebraic geometry.

Jürgen Sander, Jörn Steuding, Rasa Steuding, (Editors). — **From arithmetic to zeta-functions: number theory in memory of Wolfgang Schwarz**. — Un vol. relié, 16×24, de XXXVII, 538 p. — ISBN 978-3-319-28202-2. — Prix: €114.00. — Springer, Switzerland, 2015.

This book collects more than thirty contributions in memory of Wolfgang Schwarz, most of which were presented at the seventh International Conference on Elementary and Analytic Number Theory (ELAZ), held July 2014 in Hildesheim, Germany. Ranging from the theory of arithmetical functions to diophantine problems, to analytic aspects of zeta-functions, the various research and survey articles cover the broad interests of the well-known number theorist and cherished colleague Wolfgang Schwarz (1934–2013), who contributed over one hundred articles on number theory, its history and related fields. Readers interested in elementary or analytic number theory and related fields will certainly find many fascinating topical results among the contributions from both respected mathematicians and up-and-coming young researchers. In addition, some biographical articles highlight the life and mathematical works of Wolfgang Schwarz.

Algèbre linéaire et multilinéaire, théorie des matrices

Luis Barreira, Claudia Valls. — **Exercises in linear algebra**. — Un vol. broché, 15,5×23, de IX, 219 p. — ISBN 978-981-3143-04-3. — Prix: £32.00. — World Scientific, Singapour, 2016.

This is a book of exercises in linear algebra. Through a systematic detailed discussion of 200 solved exercises, important concepts and topics are reviewed. The student is led to make a systematic review of topics from the basics to more advanced material, with emphasis on points that often cause the greatest difficulties. The solved exercises are followed by an additional 200 proposed exercises (with answers), thus guiding the student to a systematic consolidation of all topics. The contents follow closely the majority of the introductory courses of linear algebra. We consider in particular systems of linear equations, matrices, determinants, vector spaces, linear transformations, inner products, norms, eigenvalues and eigenvectors. The variety of exercises allows the adjustment to different levels in each topic.

Anneaux et algèbres

Scott Chapman, Marco Fontana, Alfred Geroldinger, Bruce Olberding, (Editors). — **Multiplicative ideal theory and factorization theory: commutative and non-commutative perspectives**. — Springer proceedings in mathematics and statistics, vol. 170. — Un vol. relié, 16×24, de XIV, 407 p. — ISBN 978-3-319-38853-3. — Prix: €152.96. — Springer, Switzerland, 2016.

This book consists of both expository and research articles solicited from speakers at the conference entitled "Arithmetic and Ideal Theory of Rings and Semigroups," held September 22–26, 2014 at the University of Graz, Graz, Austria. It reflects recent trends in multiplicative ideal theory and factorization theory, and brings together for the first time in one volume both commutative and non-commutative

perspectives on these areas, which have their roots in number theory, commutative algebra, and algebraic geometry. Topics discussed include topological aspects in ring theory, Prüfer domains of integer-valued polynomials and their monadic submonoids, and semigroup algebras. It will be of interest to practitioners of mathematics and computer science, and researchers in multiplicative ideal theory, factorization theory, number theory, and algebraic geometry.

Roozbeh Hazrat. — **Graded rings and graded Grothendieck groups**. — London Mathematical Society lecture note series, vol. 435. — Un vol. broché, 15,5×23, de VII, 235 p. — ISBN 978-1-316-61958-2. — Prix: £50.00. — Cambridge University Press, Cambridge, 2016.

This study of graded rings includes the first systematic account of the graded Grothendieck group, a powerful and crucial invariant in algebra which has recently been adopted to classify the Leavitt path algebras. The book begins with a concise introduction to the theory of graded rings and then focuses in more detail on Grothendieck groups, Morita theory, Picard groups and K-theory. The author extends known results in the ungraded case to the graded setting and gathers together important results which are currently scattered throughout the literature. The book is suitable for advanced undergraduate and graduate students, as well as researchers in ring theory.

Théorie des groupes et généralisations

Abdallah Assi, Pedro A. García-sánchez. — **Numerical semigroups and applications**. — RSME Springer series, vol. 1. — Un vol. relié, 16×24, de XIV, 106 p. — ISBN 978-3-319-41329-7. — Prix: €81.22. — Springer, Switzerland, 2016.

This work presents applications of numerical semigroups in algebraic geometry, number theory, and coding theory. Background on numerical semigroups is presented in the first two chapters, which introduce basic notation and fundamental concepts and irreducible numerical semigroups. The focus is in particular on free semigroups, which are irreducible; semigroups associated with planar curves are of this kind. The authors also introduce semigroups associated with irreducible meromorphic series, and show how these are used in order to present the properties of planar curves. Invariants of non-unique factorizations for numerical semigroups are also studied. These invariants are computationally accessible in this setting, and thus this monograph can be used as an introduction to factorization theory. Since factorizations and divisibility are strongly connected, the authors show some applications to AG codes in the final section. The book will be of value for undergraduate students (especially those at a higher level) and also for researchers wishing to focus on the state of art in numerical semigroups research.

Fonctions de plusieurs variables complexes

Junjiro Noguchi. — **Analytic function theory of several variables: elements of Oka's coherence**. — Un vol. relié, 16,5×24, de XVIII, 397 p. — ISBN 978-981-10-0289-2. — Prix: €63.29. — Springer, Singapore, 2016.

The purpose of this book is to present the classical analytic function theory of several variables as a standard subject in a course of mathematics after learning the elementary materials (sets, general topology, algebra, one complex variable). This includes the essential parts of Grauert-Remmert's two volumes, GL227(236) (Theory of Stein spaces) and GL265 (Coherent analytic sheaves) with a lowering of the level for novice graduate students (here, Grauert's direct image theorem is limited to the case of finite maps). The core of the theory is "Oka's coherence", found and proved by Kiyoshi Oka. It is indispensable, not only in the study of complex analysis and complex geometry, but also in a large area of modern mathematics. In this book, just after an introductory chapter on holomorphic functions (Chap. 1), we prove Oka's first coherence theorem for holomorphic functions in Chap. 2. This defines a unique character of the book compared with other books on this subject, in which the notion of coherence appears much later. The present book, consisting of nine chapters, gives complete treatments of the following items: Coherence of

sheaves of holomorphic functions (Chap. 2); Oka-Cartan's fundamental theorem (Chap. 4); Coherence of ideal sheaves of complex analytic subsets (Chap. 6); Coherence of the normalization sheaves of complex spaces (Chap. 6); Grauert's finiteness theorem (Chaps. 7, 8); Oka's theorem for Riemann domains (Chap. 8). The theories of sheaf cohomology and domains of holomorphy are also presented (Chaps. 3, 5). Chapter 6 deals with the theory of complex analytic subsets. Chapter 8 is devoted to the applications of formerly obtained results, proving Cartan-Serre's theorem and Kodaira's embedding theorem. In Chap. 9, we discuss the historical development of "coherence". It is difficult to find a book at this level that treats all of the above subjects in a completely self-contained manner. In the present volume, a number of classical proofs are improved and simplified, so that the contents are easily accessible for beginning graduate students.

Équations différentielles ordinaires

Ioan I. Vrabie. — **Differential equations: an introduction to basic concepts, results and applications**. — Third edition. — Un vol. broché, 15,5×23, de XXII, 506 p. — ISBN 978-981-4759-20-5. — Prix: £37.00. — World Scientific, Singapour, 2016.

This book presents, in a unitary frame and from a new perspective, the main concepts and results of one of the most fascinating branches of modern mathematics, namely differential equations, and offers the reader another point of view concerning a possible way to approach the problems of existence, uniqueness, approximation, and continuation of the solutions to a Cauchy problem. In addition, it contains simple introductions to some topics which are not usually included in classical textbooks: the exponential formula, conservation laws, generalized solutions, Caratheodory solutions, differential inclusions, variational inequalities, viability, invariance, and gradient systems. In this new edition, some typos have been corrected and two new topics have been added: Delay differential equations and differential equations subjected to nonlocal initial conditions. The bibliography has also been updated and expanded.

Équations aux dérivées partielles

Filippo Gazzola, Kazuhiro Ishige, Carlo Nitsch, Paolo Salani, (Editors). — **Geometric properties for parabolic and elliptic PDE's: GPPEPDEs, Palinuro, Italy, May 2015**. — Springer proceedings in mathematics and statistics, vol. 176. — Un vol. relié, 16×24, de VIII, 288 p. — ISBN 978-3-319-41536-9. — Prix: €126.59. — Springer, Switzerland, 2016.

This book collects recent research papers by respected specialists in the field. It presents advances in the field of geometric properties for parabolic and elliptic partial differential equations, an area that has always attracted great attention. It settles the basic issues (existence, uniqueness, stability and regularity of solutions of initial/boundary value problems) before focusing on the topological and/or geometric aspects. These topics interact with many other areas of research and rely on a wide range of mathematical tools and techniques, both analytic and geometric. The Italian and Japanese mathematical schools have a long history of research on PDEs and have numerous active groups collaborating in the study of the geometric properties of their solutions.

Patrícia Gonçalves, Ana Jacinta Soares, (Editors). — **From particle systems to partial differential equations III: particle systems and PDEs III, Braga, Portugal, December 2014**. — Springer proceedings in mathematics and statistics, vol. 162. — Un vol. relié, 16×24, de VIII, 350 p. — ISBN 978-3-319-32142-4. — Prix: €152.96. — Springer, Switzerland, 2016.

The main focus of this book is on different topics in probability theory, partial differential equations and kinetic theory, presenting some of the latest developments in these fields. It addresses mathematical problems concerning applications in physics, engineering, chemistry and biology that were presented at the Third International Conference on Particle Systems and Partial Differential Equations, held at the University of Minho, Braga, Portugal in December 2014. The purpose of the conference was to bring together prominent researchers working in the fields of particle systems and partial differential equations, providing a venue for

them to present their latest findings and discuss their areas of expertise. Further, it was intended to introduce a vast and varied public, including young researchers, to the subject of interacting particle systems, its underlying motivation, and its relation to partial differential equations. This book will appeal to probabilists, analysts and those mathematicians whose work involves topics in mathematical physics, stochastic processes and differential equations in general, as well as those physicists whose work centers on statistical mechanics and kinetic theory.

Analyse de Fourier, analyse harmonique abstraite

Emmanuel Fricain, Javad Mashreghi. — **The theory of $\mathcal{H}(b)$ spaces**. — New mathematical monographs, vol. 20. — Un vol. relié, 16×23,5, de XIX, 681 p. — ISBN 978-1-107-02777-0. — Prix: £99.00. — Cambridge University Press, Cambridge, 2016.

An $\mathcal{H}(b)$ space is defined as a collection of analytic functions which are in the image of an operator. The theory of $\mathcal{H}(b)$ spaces bridges two classical subjects: complex analysis and operator theory, which makes it both appealing and demanding. The first volume of this comprehensive treatment is devoted to the preliminary subjects required to understand the foundation of $\mathcal{H}(b)$ spaces, such as Hardy spaces, Fourier analysis, integral representation theorems, Carleson measures, Toeplitz and Hankel operators, various types of shift operators, and Clark measures. The second volume focuses on the central theory. Both books are accessible to graduate students as well as researchers: each volume contains numerous exercises and hints, and figures are included throughout to illustrate the theory. Together, these two volumes provide everything the reader needs to understand and appreciate this beautiful branch of mathematics.

Analyse fonctionnelle

Toke M. Carlsen, Nadia S. Larsen, Sergey Neshveyev, Christian Skau, (Editors). — **Operator algebras and applications: the Abel symposium 2015**. — Abel symposia, vol. 12. — Un vol. relié, 16,5×24, de X, 342 p. — ISBN 978-3-319-39284-4. — Prix: €152.00. — Springer, Switzerland, 2016.

Like the first Abel Symposium, held in 2004, the Abel Symposium 2015 focused on operator algebras. It is interesting to see the remarkable advances that have been made in operator algebras over these years, which strikingly illustrate the vitality of the field. A total of 26 talks were given at the symposium on a variety of themes, all highlighting the richness of the subject. The field of operator algebras was created in the 1930s and was motivated by problems of quantum mechanics. It has subsequently developed well beyond its initial intended realm of applications and expanded into such diverse areas of mathematics as representation theory, dynamical systems, differential geometry, number theory and quantum algebra. One branch, known as "noncommutative geometry", has become a powerful tool for studying phenomena that are beyond the reach of classical analysis. This volume includes research papers that present new results, surveys that discuss the development of a specific line of research, and articles that offer a combination of survey and research. These contributions provide a multifaceted portrait of beautiful mathematics that both newcomers to the field of operator algebras and seasoned researchers alike will appreciate.

Géométrie différentielle

Alexander I. Bobenko, (Editor). — **Advances in discrete differential geometry**. — Un vol. relié, 16×24, de X, 439 p. — ISBN 978-3-662-50446-8. — Prix: 55.00 CHF. — Springer, Berlin, 2016.

This is one of the first books on a newly emerging field of discrete differential geometry and an excellent way to access this exciting area. It surveys the fascinating connections between discrete models in differential geometry and complex analysis, integrable systems and applications in computer graphics. The authors take a closer look at discrete models in differential geometry and dynamical systems. Their curves are polygonal, surfaces are made from triangles and quadrilaterals, and time is discrete. Nevertheless, the difference between the corresponding smooth curves, surfaces and classical dynamical systems with continuous time can hardly be seen. This is the paradigm of structure-preserving discretizations. Current advances in this field are stimulated to a large extent by its relevance for computer graphics and mathematical physics. This book is written by specialists working together on a common research project. It is about differential geometry and dynamical systems, smooth and discrete theories, and on pure mathematics and its practical applications. The interaction of these facets is demonstrated by concrete examples, including discrete conformal mappings, discrete complex analysis, discrete curvatures and special surfaces, discrete integrable systems, conformal texture mappings in computer graphics, and free-form architecture. This richly illustrated book will convince readers that this new branch of mathematics is both beautiful and useful. It will appeal to graduate students and researchers in differential geometry, complex analysis, mathematical physics, numerical methods, discrete geometry, as well as computer graphics and geometry processing.

Akito Futaki, Reiko Miyaoka, Zizhou Tang, Weiping Zhang, (Editors). — **Geometry and topology of manifolds: 10th China-Japan geometry conference held in Shangai, China, September 2014**. — Springer proceedings in mathematics and statistics, vol. 154. — Un vol. relié, 16,5×24, de XII, 348 p. — ISBN 978-4-431-56019-7. — Prix: €152.96. — Springer, Japan, 2016.

Since the year 2000, we have witnessed several outstanding results in geometry that have solved long-standing problems such as the Poincaré conjecture, the Yau–Tian–Donaldson conjecture, and the Willmore conjecture. There are still many important and challenging unsolved problems including, among others, the Strominger–Yau–Zaslow conjecture on mirror symmetry, the relative Yau–Tian–Donaldson conjecture in Kähler geometry, the Hopf conjecture, and the Yau conjecture on the first eigenvalue of an embedded minimal hypersurface of the sphere. For the younger generation to approach such problems and obtain the required techniques, it is of the utmost importance to provide them with up-to-date information from leading specialists. The geometry conference for the friendship of China and Japan has achieved this purpose during the past 10 years. Their talks deal with problems at the highest level, often accompanied with solutions and ideas, which extend across various fields in Riemannian geometry, symplectic and contact geometry, and complex geometry.

Fei Han, Xingwang Xu, Weiping Zhang, (Editors). — **Geometric analysis around scalar curvatures**. — Lecture notes series, Institute for Mathematical Sciences, National University of Singapore, vol. 31. — Un vol. relié, 16×23,5, de X, 210 p. — ISBN 978-981-3100-54-1. — Prix: £88.00. — World Scientific, Singapour, 2016.

This volume contains three expanded lecture notes from the program Scalar Curvature in Manifold Topology and Conformal Geometry that was held at the Institute for Mathematical Sciences from 1 November to 31 December 2014. The first chapter surveys the recent developments on the fourth-order equations with negative exponent from geometric points of view such as positive mass theorem and uniqueness results. The next chapter deals with the recent important progress on several conjectures such as the existence of non-flat smooth hyper-surfaces and Serrin's over-determined problem. And the final chapter induces a new technique to handle the equation with critical index and the sign change coefficient as well as the negative index term. These topics will be of interest to those studying conformal geometry and geometric partial differential equations.

Yi-Bing Shen, Zhongmin Shen. — **Introduction to modern Finsler geometry**. — Un vol. relié, 16×23,5, de XII, 393 p. — ISBN 978-981-4704-90-8. — Prix: £66.00. — World Scientific, Singapour, 2016.

This comprehensive book is an introduction to the basics of Finsler geometry with recent developments in its area. It includes local geometry as well as global geometry of Finsler manifolds. In Part I, the authors discuss differential manifolds, Finsler metrics, the Chern connection, Riemannian and non-Riemannian quantities. Part II is written for readers who would like to further their studies in Finsler geometry. It covers projective transformations, comparison theorems, fundamental group, minimal immersions, harmonic maps, Einstein metrics, conformal transformations, amongst other related topics. The authors made great efforts to ensure that the contents are accessible to senior undergraduate students, graduate students, mathematicians and scientists.

Topologie algébrique

Torsten Wedhorn. — **Manifolds, sheaves, and cohomology**. — Springer studium mathematik – master. — Un vol. broché, 17×24, de XVI, 354 p. — ISBN 978-3-658-10632-4. — Prix: €47.59. — Springer, Wiesbaden, 2016.

This book explains techniques that are essential in almost all branches of modern geometry such as algebraic geometry, complex geometry, or non-archimedian geometry. It uses the most accessible case, real and complex manifolds, as a model. The author especially emphasizes the difference between local and global questions. *Cohomology theory of sheaves* is introduced and its usage is illustrated by many examples.

Topologie des variétés, analyse globale et analyse des variétés

Vladimir G. Turaev. — **Quantum invariants of knots and 3-manifolds**. — Third edition. — De Gruyter studies in mathematics, vol. 18. — Un vol. relié, 17,5×24, de XII, 596 p. — ISBN 978-3-11-044266-3. — Prix: €149.95. — De Gruyter, Berlin, 2016.

Due to the strong appeal and wide use of this monograph, it is now available in its third revised edition. The monograph gives a systematic treatment of 3-dimensional topological quantum field theories (TQFTs) based on the work of the author with N. Reshetikhin and O. Viro. This subject was inspired by the discovery of the Jones polynomial of knots and the Witten-Chern-Simons field theory. On the algebraic side, the study of 3-dimensional TQFTs has been influenced by the theory of braided categories and the theory of quantum groups. The book is divided into three parts. Part I presents a construction of 3-dimensional TQFTs and 2-dimensional modular functors from so-called modular categories. This gives a vast class of knot invariants and 3-manifold invariants as well as a class of linear representations of the mapping class groups of surfaces. In Part II the technique of 6j-symbols is used to define state sum invariants of 3-manifolds. Their relation to the TQFTs constructed in Part I is established via the theory of shadows. Part III provides constructions of modular categories, based on quantum groups and skein modules of tangles in the 3-space. This fundamental contribution to topological quantum field theory is accessible to graduate students in mathematics and physics with knowledge of basic algebra and topology. It is an indispensable source for everyone who wishes to enter the forefront of this fascinating area at the borderline of mathematics and physics.

Probabilités et processus stochastiques

Jianhai Bao, George Yin, Chenggui Yuan. — **Asymptotic analysis for functional stochastic differential equations**. — Springer briefs in mathematics. — Un vol. broché, 15,5×23,5, de XVI, 151 p. — ISBN 978-3-319-46978-2. — Prix: US$54.99. — Springer, Cham, 2016.

This brief treats dynamical systems that involve delays and random disturbances. The study is motivated by a wide variety of systems in real life in which random noise has to be taken into consideration and the effect of delays cannot be ignored. Concentrating on such systems that are described by functional stochastic differential equations, this work focuses on the study of large time behavior, in particular, ergodicity. This brief is written for probabilists, applied mathematicians, engineers, and scientists who need to use delay systems and functional stochastic differential equations in their work. Selected topics from the brief can also be used in a graduate level topics course in probability and stochastic processes.

Gennady Samorodnitsky. — **Stochastic processes and long range dependence**. — Springer series in operation research and financial engineering. — Un vol. relié, 16×24, de XI, 415 p. — ISBN 978-3-319-45574-7. — Prix: US$129.00. — Springer, Switzerland, 2016.

This monograph is a gateway for researchers and graduate students to explore the profound, yet subtle, world of long-range dependence (also known as long memory). The text is organized around the probabilistic properties of stationary processes that are important for determining the presence or absence of long memory. The first few chapters serve as an overview of the general theory of stochastic processes which gives the reader sufficient background, language, and models for the subsequent discussion of long memory. The later chapters devoted to long memory begin with an introduction to the subject along with a brief history of its development, followed by a presentation of what is currently the best known approach, applicable to stationary processes with a finite second moment. The book concludes with a chapter devoted to the author's own, less standard, point of view of long memory as a phase transition, and even includes some novel results. Most of the material in the book has not previously been published in a single self-contained volume, and can be used for a one- or two-semester graduate topics course. It is complete with helpful exercises and an appendix which describes a number of notions and results belonging to the topics used frequently throughout the book, such as topological groups and an overview of the Karamata theorems on regularly varying functions.

Peter Zörnig. — **Probability theory and statistical applications : a profound treatise for self-study**. — De Gruyter graduate. — Un vol. broché, 17×24, de IX, 284 p. — ISBN 978-3-11-036319-7. — Prix: €39.95. — De Gruyter, Berlin, 2016.

This accessible and easy-to-read book provides many examples to illustrate diverse topics in probability and statistics, from initial concepts up to advanced calculations. Special attention is devoted, e.g., to independency of events, inequalities in probability and functions of random variables. The book is directed to students of mathematics, statistics, engineering, and other quantitative sciences, in particular to readers who need or want to learn by self-study. The author is convinced that sophisticated examples are more useful for the student than a lengthy formalism treating the greatest possible generality. Characteristic features are: many examples and illustrations. – Numerous exercises with detailed solutions. – Mathematically rigorous, but exaggerate formalism is avoided.

Analyse numérique

Xiao-Qing Jin, Seak-Weng Vong. — **An introduction to applied matrix analysis**. — Series in contemporary applied mathematics, vol. 20. — Un vol. relié, 16×23,5, de XIII, 130 p. — ISBN 978-981-4749-46-6. — Prix: £40.00. — World Scientific, New Jersey, 2016.

It is well known that most problems in science and engineering eventually progress into matrix problems. This book gives an elementary introduction to applied matrix theory and it also includes some new results obtained in recent years. The book consists of eight chapters. It includes perturbation and error analysis;

the conjugate gradient method for solving linear systems; preconditioning techniques; and least squares algorithms based on orthogonal transformations, etc. The last two chapters include some latest development in the area. In Chapter 7, we construct optimal preconditioners for functions of matrices. More precisely, let f be a function of matrices. Given a matrix A, there are two choices of constructing optimal preconditioners for $f(A)$. Properties of these preconditioners are studied for different functions. In Chapter 8, we study the Bottcher–Wenzel conjecture and discuss related problems. This is a textbook for senior undergraduate or junior graduate students majoring in science and engineering. The material is accessible to students who, in various disciplines, have basic linear algebra, calculus, numerical analysis, and computing knowledge. The book is also useful to researchers in computational science who are interested in applied matrix theory.

Valarmathi Sigamani, John J. H. Miller, Ramanujam Narasimhan, Paramasivam Mathiazhagan, Franklin Victor, (Editors). — **Differential equations and numerical analysis : Tiruchirappalli, India, January 2015**. — Springer proceedings in mathematics and statistics, vol. 172. — Un vol. relié, 16×24,5, de XI, 165 p. — ISBN 978-81-322-3596-5. — Prix: €152.96. — Springer, India, 2016.

This book offers an ideal introduction to singular perturbation problems, and a valuable guide for researchers in the field of differential equations. It also includes chapters on new contributions to both fields: differential equations and singular perturbation problems. Written by experts who are active researchers in the related fields, the book serves as a comprehensive source of information on the underlying ideas in the construction of numerical methods to address different classes of problems with solutions of different behaviors, which will ultimately help researchers to design and assess numerical methods for solving new problems. All the chapters presented in the volume are complemented by illustrations in the form of tables and graphs.

Mécanique des solides, élasticité et plasticité

Yasumasa Nishiura, Motoko Kotani, (Editors). — **Mathematical challenges in a new phase of materials science, Kyoto, Japan, August 2014**. — Springer proceedings in mathematics & statistics, vol. 166. — Un vol. relié, 16×24, de VII, 157 p. — ISBN 978-4-431-56102-6. — Prix: US$129.00. — Springer, Japan, 2016.

This volume comprises eight papers delivered at the RIMS International Conference “Mathematical Challenges in a New Phase of Materials Science”, Kyoto, August 4–8, 2014. The contributions address subjects in defect dynamics, negatively curved carbon crystal, topological analysis of di-block copolymers, persistence modules, and fracture dynamics. These papers highlight the strong interaction between mathematics and materials science and also reflect the activity of WPI-AIMR at Tohoku University, in which collaborations between mathematicians and experimentalists are actively ongoing.

Mécanique quantique

Felix Finster. — **The continuum limit of causal fermion systems : from Planck scale structures to macroscopic physics**. — Fundamental theories of physics, vol. 186. — Un vol. relié, 16×24, de XI, 548 p. — ISBN 978-3-319-42066-0. — Prix: €117.69. — Springer, Switzerland, 2016.

This monograph introduces the basic concepts of the theory of causal fermion systems, a recent approach to the description of fundamental physics. The theory yields quantum mechanics, general relativity and quantum field theory as limiting cases and is therefore a candidate for a unified physical theory. From the mathematical perspective, causal fermion systems provide a general framework for describing and analyzing non-smooth geometries and “quantum geometries”. The dynamics is described by a novel variational principle, called the causal action principle. In addition to the basics, the book provides all the necessary mathematical background and explains how the causal action principle gives rise to the interactions of the standard model plus gravity on the level of second-quantized fermionic fields coupled to classical bosonic fields. The focus is on getting a mathematically sound connection between causal fermion

systems and physical systems in Minkowski space. The book is intended for graduate students entering the field, and is furthermore a valuable reference work for researchers in quantum field theory and quantum gravity.

Piotr Kielanowski, S. Twareque Ali, Pierre Bieliavsky, Anatol Odzijewicz, Martin Schlichenmaier, Theodore Voronov, (Editors). — **Geometric methods in physics: XXXIV Workshop, Białowieża, Poland, June 28 – July 4, 2015**. — Trends in mathematics. — Un vol. relié, 16×24, de XII, 396 p. — ISBN 978-3-319-31755-7. — Prix: €73.84. — Springer, Switzerland, 2016.

This book features a selection of articles based on the XXXIV Białowieża Workshop on Geometric Methods in Physics, 2015. The articles presented are mathematically rigorous, include important physical implications and address the application of geometry in classical and quantum physics. Special attention deserves the session devoted to discussions of Gerard Emch's most important and lasting achievements in mathematical physics. The Białowieża workshops are among the most important meetings in the field and gather participants from mathematics and physics alike. Despite their long tradition, the Workshops remain at the cutting edge of ongoing research. For the past several years, the Białowieża Workshop has been followed by a School on geometry and physics, where advanced lectures for graduate students and young researchers are presented. The unique atmosphere of the Workshop and School is enhanced by the venue, framed by the natural beauty of the Białowieża forest in eastern Poland.

Information, communication, circuits

Christopher G. Brinton, Mung Chiang. — **The power of networks: six principles that connect our lives**. — Un vol. relié, 16×24, de XI, 310 p. — ISBN 978-0-691-17071-8. — Prix: £27.95. — Princeton University Press, Princeton/Oxford, 2017.

What makes WiFi faster at home than at a coffee shop? How does Google order search results? Why do Amazon, Netflix, and YouTube use fundamentally different rating and recommendation methods — and why does it matter? Is it really true that everyone on Facebook is connected in six steps or less? And how do cat videos — or anything else — go viral? *The power of networks* answers questions like these for the first time in a way that all of us can understand and use, whether at home, the office, or school. Using simple language, analogies, stories, hundreds of illustrations, and no more math than simple addition and multiplication, Christopher Brinton and Mung Chiang provide a smart but accessible introduction to the handful of big ideas that drive the technical and social networks we use every day—from cellular phone networks and cloud computing to the Internet and social media platforms. *The power of networks* unifies these ideas through six fundamental principles of networking, which explain the difficulties in sharing network resources efficiently, how crowds can be wise or not so wise depending on the nature of their connections, how there are many building-blocks of layers in a network, and more. Understanding these simple ideas unlocks the workings of everything from the connections we make on Facebook to the technology that runs such platforms. Along the way, the authors also talk with and share the special insights of renowned experts such as Google's Eric Schmidt, former Verizon Wireless CEO Dennis Strigl, and "fathers of the Internet" Vint Cerf and Bob Kahn. Networks are everywhere. *The power of networks* shows how they work — and what understanding them can do for you.