Zeitschrift: L'Enseignement Mathématique
Herausgeber: Commission Internationale de l'Enseignement Mathématique
Band: 62 (2016)
Heft: 1-2

Buchbesprechung: Bulletin bibliographique

Extrait de *L'Enseignement Mathématique* (2) 62 (2016), fasc. 1–2

Bulletin bibliographique

Généralités

Robert E. Bradley, Salvatore J. Petrilli, C. Edward Sandifer. — **L'Hôpital's analyse des infiniments petits**. — An annotated translation with source material by Johann Bernoulli. — Science networks historical studies, vol. 50. — Un vol. broché, 16×24, de LIV, 311 p. — ISBN 978-3-319-17114-2. — Prix : SFr. 160.00. — Birkhauser/Springer, Cham, 2015.

This monograph is an annotated translation of what is considered to be the world's first calculus textbook, originally published in French in 1696. That anonymously published textbook on differential calculus was based on lectures given to the Marquis de l'Hôpital in 1691-2 by the great Swiss mathematician, Johann Bernoulli. In the 1920s, a copy of Bernoulli's lecture notes was discovered in a library in Basel, which presented the opportunity to compare Bernoulli's notes, in Latin, to l'Hôpital's text in French. The similarities are remarkable, but there is also much in l'Hôpital's book that is original and innovative. This book offers the first English translation of Bernoulli's notes, along with the first faithful English translation of l'Hôpital's text, complete with annotations and commentary. Additionally, a significant portion of the correspondence between l'Hôpital and Bernoulli has been included, also for the first time in English translation. This translation will provide students and researchers with direct access to Bernoulli's ideas and l'Hôpital's innovations. Both enthusiasts and scholars of the history of science and the history of mathematics will find food for thought in the texts and notes of the Marquis de l'Hôpital and his teacher, Johann Bernoulli.

John W. Dawson, Jr. — **Why prove it again ? Alternative proofs in mathematical practice**. — With the assistance of Bruce S. Babcock and with a chapter by Steven H. Weintraub. — Un vol. relié, 16×24, de XI, 204 p. — ISBN 978-3-319-17367-2. — Prix : SFr. 96.00. — Birkhäuser/Springer, Cham, 2015.

This monograph considers several well-known mathematical theorems and asks the question, "Why prove it again ?" while examining alternative proofs. It explores the different rationales mathematicians may have for pursuing and presenting new proofs of previously established results, as well as how they judge whether two proofs of a given result are different. While a number of books have examined alternative proofs of individual theorems, this is the first that presents comparative case studies of other methods for a variety of different theorems. The author begins by laying out the criteria for distinguishing among proofs and enumerates reasons why new proofs have, for so long, played a prominent role in mathematical practice. He then outlines various purposes that alternative proofs may serve. Each chapter that follows provides a detailed case study of alternative proofs for particular theorems, including the Pythagorean theorem, the Fundamental theorem of arithmetic, Desargues theorem, the Prime number theorem, and the proof of the irreducibility of cyclotomic polynomials. *Why prove it again ?* will appeal to a broad range of readers, including historians and philosophers of mathematics, students, and practicing mathematicians. Additionally, teachers will find it to be a useful source of alternative methods of presenting material to their students.

Paul J. Nahin. — **In praise of simple physics : the science and mathematics behind everyday questions**. — Un vol. relié, 16×24, de XXIII, 241 p. — ISBN 978-0-691-16693-3. — Prix : US$29.95. — Princeton University Press, Princeton/Oxford, 2016.

Physics can explain many of the things that we commonly encounter. It can tell us why the night is dark, what causes the tides, and even how best to catch a baseball. With *In praise of simple physics*,

popular math and science writer Paul Nahin presents a plethora of situations that explore the science and math behind the wonders of everyday life. Roaming through a diverse range of puzzles, he illustrates how physics shows us ways to wring more energy from renewable sources, to measure the gravity in our car garages, to figure out which of three light switches in the basement controls the light bulb in the attic, and much, much more. How fast can you travel from London to Paris ? How do scientists calculate the energy of an atomic bomb explosion ? How do you kick a football so it stays in the air and goes a long way downfield ? Nahin begins with simpler problems and progresses to more challenging questions, and his entertaining, accessible, and scientifically and mathematically informed explanations are all punctuated by his trademark humor. Readers are presumed to have some background in beginning differential and integral calculus. Whether you simply have a personal interest in physics' influence in the world or you're an engineering and science student who wants to gain more physics know-how, this book has an intriguing scenario for you. *In praise of simple physics* proves that if we look carefully at the world around us, physics has answers for the most astonishing day-to-day occurrences.

Hans-Jörg Ruppen. — **Préparer ses études scientifiques : introduction aux fonctions trigonométriques, logarithmiques et exponentielles**. — Enseignement des mathématiques. — Un vol. broché, 20,5×28, de XII, 224 p. — ISBN 978-2-88915-127-1. — Prix : SFr. 49.50. — Presses polytechniques et universitaires romandes, Lausanne, 2016.

Cet ouvrage, tout spécialement conçu pour les lycéens et gymnasiens désireux de s'orienter vers des études supérieures scientifiques, propose une introduction simple et accessible aux fonctions trigonométriques, logarithmiques et exponentielles, dont la maîtrise est indispensable à l'entrée à l'université ou en école d'ingénieur. Clair et synthétique, richement illustré et tout en couleur, ce manuel expose les usages et les propriétés spécifiques de chacune de ces fonctions élémentaires. Il propose de nombreux exemples et problèmes résolus, permettant une auto-évaluation permanente au fil de l'exposé, et rappelle les concepts importants en lien avec la résolution d'équations, la continuité et la dérivabilité. Ce manuel adopte par ailleurs une structure basée sur l'enseignement en ligne conçu par l'auteur (`moocs.epfl.ch`). L'indispensable pour une entrée gagnante en Bachelor scientifique.

John Stillwell. — **Elements of mathematics: from Euclid to Gödel**. — Un vol. relié, 16×24, de XIV, 422 p. — ISBN 9780691171685. — Prix: US$39.95. — Princeton University Press, Princeton/Oxford, 2016.

Elements of mathematics takes readers on a fascinating tour that begins in elementary mathematics—but, as John Stillwell shows, this subject is not as elementary or straightforward as one might think. Not all topics that are part of today's elementary mathematics were always considered as such, and great mathematical advances and discoveries had to occur in order for certain subjects to become "elementary". Stillwell examines elementary mathematics from a distinctive twenty-first-century viewpoint and describes not only the beauty and scope of the discipline, but also its limits. From Gaussian integers to propositional logic, Stillwell delves into arithmetic, computation, algebra, geometry, calculus, combinatorics, probability, and logic. He discusses how each area ties into more advanced topics to build mathematics as a whole. Through a rich collection of basic principles, vivid examples, and interesting problems, Stillwell demonstrates that elementary mathematics becomes advanced with the intervention of infinity. Infinity has been observed throughout mathematical history, but the recent development of "reverse mathematics" confirms that infinity is essential for proving well-known theorems, and helps to determine the nature, contours, and borders of elementary mathematics. *Elements of Mathematics* gives readers, from high school students to professional mathematicians, the highlights of elementary mathematics and glimpses of the parts of math beyond its boundaries.

Logique et fondements

Ivan Chajda, Jan Paseka. — **Algebraic approach to tense operators**. — Research and exposition in mathematics, vol. 35. — Un vol. broché, 17×24, de 204 p. — ISBN 978-3-88538-235-5. — Prix: SFr. 35.00. — Heldermann Verlag, Lemgo, 2015.

Propositional logics, both classical and non-classical, usually do not incorporate the dimension of time. However, even Aristotle already mentioned that time plays an important role in the evaluation of truth values of propositions. His well-known example was the statement "There will be a sea battle tomorrow". Certainly, tomorrow it will be clear if this proposition is true or false, but today we cannot assign one of these values. Therefore, he accepted that two-valued logic cannot capture the entire human thinking. After Aristotle's time, a lot was created by men and, nowadays, logic is not an exceptional area for human reasoning. From the 1940's on, computers were built and the era of the Artificial Intelligence gently started. Nowadays, practically any more advanced product contains some kind of processor which decides situations in a way similar to that of a human being. However, for such technical devices the forecast for truth values of propositions in the future is not only a speculation. Due to the constructions and the technical possibilities, we can often compute these values, and propositions concerning the near future are of great importance for the control of these systems. This has motivated many authors to investigate the so-called temporal logic, i.e., the logic where time is considered as a variable of the propositional formula. Tense logic was introduced by Arthur Prior in the late 1950's as a result of his interest in the relationship between tense and modality. The logical language of tense logic contains, in addition to the usual truth-functional operators, four the so-called modal operators. The aim of this monograph is not to present tense logic in full detail. As Aristotle's logic was useful for two millennia in science, but for computer programming only its formalization via Boolean algebras is applied, we will present only an algebraic axiomatization of tense logic and tense operators here. Classical propositional logic was axiomatized by George Boole via Boolean algebras, but this was only a starting point for the formalization of logic. In 1930 intuitionistic logic was formalized by the use of Heyting algebras, in the late 1950's the many-valued Lukasiewicz logic was axiomatized by C.C. Chang by the so-called MV-algebras, many-valued Post logic by Post algebras and in recent decades fuzzy logic, relevance logic, Hájek's basic logic and linear logic by residuated lattices. Hence, we will use algebraic tools for the axiomatization of tense operators. Using the fact that these are modal operators, we will axiomatize also modal operators in this way. Since all of these operators can be considered as quantifiers, we will start with the axiomatization of quantifiers developed by P. Halmos and J.D. Rutledge. Our algebraic methods and tools will be described in full detail, without taking into account whether the reader is or is not a specialist in lattice theory. The authors hope that their monograph will not be the final attempt at the field of modal and tense operators and the development of corresponding algebraic tools and methods but, on the contrary, it will serve as a compendium and, possibly, a motivation for the readers for their future research.

Analyse combinatoire

Yuefeng Feng. — **Combinatorial extremization**. — Mathematical olympiad series, vol. 13. — Un vol. broché, 15×23, de IX, 217 p. — ISBN 978-981-4723-16-9. — Prix: £21.00. — East China Normal University Press / World Scientific, Shangai / Singapore, 2016.

In China, lots of excellent students who are good at maths take an active part in various maths contests and the best six senior high school students will be selected to form the IMO National Team to compete in the International Mathematical Olympiad. In the past ten years China's IMO Team has achieved outstanding results — they have won the first place almost every year. The author is one of the coaches of China's IMO National Team, whose students have won many gold medals many times in IMO. This book is part of the Mathematical Olympiad Series which discusses several aspects related to maths contests, such as algebra, number theory, combinatorics, graph theory and geometry. The book elaborates on methods of discrete extremization, such as inequality control, repeated extremum, partial adjustment, exploiting symmetry, polishing transform, space estimates, etc.

Chris Godsil, Karen Meagher. — **Erdös-Ko-Rado theorems: algebraic approaches**. — Cambridge studies in advanced mathematics, vol. 149. — Un vol. relié, 15,5×23,5, de XVI, 335 p. — ISBN 978-1-107-12844-6. — Prix: £49.99. — Cambridge University Press, Cambridge, 2016.

Aimed at graduate students and researchers, this fascinating text provides a comprehensive study of the Erdős-Ko-Rado theorem, with a focus on algebraic methods. The authors begin by discussing well-known

proofs of the EKR bound for intersecting families. The natural generalization of the EKR Theorem holds for many different objects that have a notion of intersection, and the bulk of this book focuses on algebraic proofs that can be applied to these different objects. The authors introduce tools commonly used in algebraic graph theory and show how these can be used to prove versions of the EKR theorem. Topics include association schemes, strongly regular graphs, the Johnson scheme, the Hamming scheme and the Grassmann scheme. Readers can expand their understanding at every step with the 170 end-of-chapter exercises. The final chapter discusses in detail 15 open problems, each of which would make an interesting research project.

Jocelyn QUAINTANCE, H.W. GOULD. — **Combinatorial identities for Stirling numbers: the unpublished notes of H.W. Gould**. — Un vol. relié, 15,5×23,5, de XV, 260 p. — ISBN 978-981-4725-26-2. — Prix: £50.00. — World Scientific, Singapore, 2016.

This book is a unique work which provides an in-depth exploration into the mathematical expertise, philosophy, and knowledge of H.W. Gould. It is written in a style that is accessible to the reader with basic mathematical knowledge, and yet contains material that will be of interest to the specialist in enumerative combinatorics. This book begins with exposition on the combinatorial and algebraic techniques that Professor Gould uses for proving binomial identities. These techniques are then applied to develop formulas which relate Stirling numbers of the second kind to Stirling numbers of the first kind. Professor Gould's techniques also provide connections between both types of Stirling numbers and Bernoulli numbers. Professor Gould believes his research success comes from his intuition on how to discover combinatorial identities. This book will appeal to a wide audience and may be used either as lecture notes for a beginning graduate level combinatorics class, or as a research supplement for the specialist in enumerative combinatorics.

Théorie des nombres

Avner ASH, Robert GROSS. — **Summing it up: from one plus one to modern number theory**. — Un vol. relié, 16×24, de XIII, 229 p. — ISBN 9780691170190. — Prix: £27.95. — Princeton University Press, Princeton/Oxford, 2016.

We use addition on a daily basis—yet how many of us stop to truly consider the enormous and remarkable ramifications of this mathematical activity? *Summing It Up* uses addition as a springboard to present a fascinating and accessible look at numbers and number theory, and how we apply beautiful numerical properties to answer math problems. Mathematicians Avner Ash and Robert Gross explore addition's most basic characteristics as well as the addition of squares and other powers before moving onward to infinite series, modular forms, and issues at the forefront of current mathematical research. Ash and Gross tailor their succinct and engaging investigations for math enthusiasts of all backgrounds. Employing college algebra, the first part of the book examines such questions as, can all positive numbers be written as a sum of four perfect squares? The second section of the book incorporates calculus and examines infinite series—long sums that can only be defined by the concept of limit, as in the example of $1 + 1/2 + 1/4 + \ldots = ?$ With the help of some group theory and geometry, the third section ties together the first two parts of the book through a discussion of modular forms—the analytic functions on the upper half-plane of the complex numbers that have growth and transformation properties. Ash and Gross show how modular forms are indispensable in modern number theory, for example in the proof of Fermat's Last Theorem. Appropriate for numbers novices as well as college math majors, *Summing It Up* delves into mathematics that will enlighten anyone fascinated by numbers.

Alain ESCASSUT. — **Value distribution in p-adic analysis**. — Un vol. relié, 18×25, de XIII, 544 p. — ISBN 978-981-4730-10-5. — Prix: £104.00. — World Scientific, New Jersey, 2016.

The book first explains the main properties of analytic functions in order to use them in the study of various problems in p-adic value distribution. Certain properties of p-adic transcendental numbers are examined such as order and type of transcendence, with problems on p-adic exponentials. Lazard's problem for analytic functions inside a disk is explained. P-adic meromorphics are studied. Sets of range uniqueness in a p-adic field are examined. The ultrametric Corona problem is studied. Injective analytic elements are characterized. The p-adic Nevanlinna theory is described and many applications are given: p-adic Hayman

conjecture, Picard's values for derivatives, small functions, branched values, growth of entire functions, problems of uniqueness, URSCM and URSIM, functions of uniqueness, sharing value problems, Nevanlinna theory in characteristic $p > 0$, p-adic Yosida's equation.

Corps et polynômes

Jean-Pierre Tignol. — **Galois' theory of algebraic equations**. — Second edition. — Un vol. relié, 16×24, de XVI, 308 p. — ISBN 978-981-4704-69-4. — Prix: £51.00. — World Scientific, New Jersey, 2016.

The book gives a detailed account of the development of the theory of algebraic equations, from its origins in ancient times to its completion by Galois in the nineteenth century. The appropriate parts of works by Cardano, Lagrange, Vandermonde, Gauss, Abel, and Galois are reviewed and placed in their historical perspective, with the aim of conveying to the reader a sense of the way in which the theory of algebraic equations has evolved and has led to such basic mathematical notions as "group" and "field". A brief discussion of the fundamental theorems of modern Galois theory and complete proofs of the quoted results are provided, and the material is organized in such a way that the more technical details can be skipped by readers who are interested primarily in a broad survey of the theory. In this second edition, the exposition has been improved throughout and the chapter on Galois has been entirely rewritten to better reflect Galois' highly innovative contributions. The text now follows more closely Galois' memoir, resorting as sparsely as possible to anachronistic modern notions such as field extensions. The emerging picture is a surprisingly elementary approach to the solvability of equations by radicals, and yet is unexpectedly close to some of the most recent methods of Galois theory.

Géométrie algébrique

Radu Laza, Matthias Schütt, Noriko Yui, (Editors). — **Calabi-Yau varieties: arithmetic, geometry and physics: lecture notes on concentrated graduate courses**. — Fields Institute monographs, vol. 34. — Un vol. relié, 16×24, de X, 547 p. — ISBN 978-1-4939-2829-3. — Prix: US$149.00. — Springer, New York, 2015.

This volume presents a lively introduction to the rapidly developing and vast research areas surrounding Calabi-Yau varieties and string theory. With its coverage of the various perspectives of a wide area of topics such as Hodge theory, Gross-Siebert program, moduli problems, toric approach, and arithmetic aspects, the book gives a comprehensive overview of the current streams of mathematical research in the area. The contributions in this book are based on lectures that took place during workshops with the following thematic titles: "Modular Forms Around String Theory", "Enumerative Geometry and Calabi-Yau Varieties", "Physics Around Mirror Symmetry", "Hodge Theory in String Theory". The book is ideal for graduate students and researchers learning about Calabi-Yau varieties as well as physics students and string theorists who wish to learn the mathematics behind these varieties.

Lenny Taelman. — **Sheaves and functions modulo p**. — London Mathematical Society lecture note series, vol. 429. — Un vol. relié, 15×23, de VI, 125 p. — ISBN 978-1-316-50259-4. — Prix: £40.00. — Cambridge University Press, Cambridge, 2016.

The Woods Hole trace formula is a Lefschetz fixed-point theorem for coherent cohomology on algebraic varieties. It leads to a version of the sheaves-functions dictionary of Deligne, relating characteristic-p-valued functions on the rational points of varieties over finite fields to coherent modules equipped with a Frobenius structure. This book begins with a short introduction to the homological theory of crystals of Böckle and Pink with the aim of introducing the sheaves-functions dictionary as quickly as possible, illustrated with elementary examples and classical applications. Subsequently, the theory and results are expanded to include infinite coefficients, L-functions, and applications to special values of Goss L-functions and zeta functions. Based on lectures given at the Morningside Center in Beijing in 2013, this book serves as both an introduction to the Woods Hole trace formula and the sheaves-functions dictionary, and to some advanced applications on characteristic p zeta values.

Algèbre linéaire et multilinéaire, théorie des matrices

Zhaojun Bai, Weiguo Gao, Yangfeng Su, (Editors). — **Matrix functions and matrix equations**. — Series in contemporary applied mathematics, vol. 19. — Un vol. relié, 15,5×23,5, de VII, 137 p. — ISBN 978-981-4675-76-5. — Prix: £50.00. — World Scientific, New Jersey, 2015.

Matrix functions and matrix equations are widely used in science, engineering and social sciences due to the succinct and insightful way in which they allow problems to be formulated and solutions to be expressed. This book covers materials relevant to advanced undergraduate and graduate courses in numerical linear algebra and scientific computing. It is also well-suited for self-study. The broad content makes it convenient as a general reference to the subjects.

Isaiah Lankham, Bruno Nachtergaele, Anne Schilling. — **Linear algebra as an introduction to abstract mathematics**. — Un vol. broché, 17×24, de X, 198 p. — ISBN 978-981-4723-77-0. — Prix: £24.00. — World Scientific, New Jersey, 2016.

This is an introductory textbook designed for undergraduate mathematics majors with an emphasis on abstraction and in particular, the concept of proofs in the setting of linear algebra. Typically such a student would have taken calculus, though the only prerequisite is suitable mathematical grounding. The purpose of this book is to bridge the gap between the more conceptual and computational oriented undergraduate classes to the more abstract oriented classes. The book begins with systems of linear equations and complex numbers, then relates these to the abstract notion of linear maps on finite-dimensional vector spaces, and covers diagonalization, eigenspaces, determinants, and the spectral theorem. Each chapter concludes with both proof-writing and computational exercises.

Robert G. Underwood. — **Fundamentals of modern algebra: a global perspective**. — Un vol. relié, 16×24, de X, 220 p. — ISBN 978-981-4730-28-0. — Prix: £79.00. — World Scientific, New Jersey, 2016.

The purpose of this book is to provide a concise yet detailed account of fundamental concepts in modern algebra. The target audience for this book is first-year graduate students in mathematics, though the first two chapters are probably accessible to well-prepared undergraduates. The book covers a broad range of topics in modern algebra and includes chapters on groups, rings, modules, algebraic extension fields, and finite fields. Each chapter begins with an overview which provides a road map for the reader showing what material will be covered. At the end of each chapter we collect exercises which review and reinforce the material in the corresponding sections. These exercises range from straightforward applications of the material to problems designed to challenge the reader. We also include a list of "Questions for Further Study" which pose problems suitable for master's degree research projects.

Anneaux et algèbres

David Eisenbud, Srikanth B. Iyengar, Anurag K. Singh, J. Toby Stafford, Michel Van Den Bergh, (Editors). — **Commutative algebra and noncommutative algebraic geometry**. — Volume 1: Expository articles. Volume 2: Research articles. — Mathematical Sciences Research Institute publications, vol. 67-68. — Deux vol. reliés, 16,5×24, de 722 p. — ISBN 978-1-107-06562-8. — Prix: US$120.00. — Cambridge University Press, New York, 2015.

In the 2012–13 academic year, the Mathematical Sciences Research Institute, Berkeley, hosted programs in commutative algebra (Fall 2012 and Spring 2013) and noncommutative algebraic geometry and representation theory (Spring 2013). There have been many significant developments in these fields in recent years; what is more, the boundary between them has become increasingly blurred. This was apparent during the MSRI program, where there were a number of joint seminars on subjects of common interest: birational geometry, D-modules, invariant theory, matrix factorizations, noncommutative resolutions, singularity categories, support varieties, and tilting theory, to name a few. These volumes reflect the lively interaction between the subjects witnessed at MSRI. The introductory workshops and connections for women workshops for the two programs included lecture series by experts in the field. The volumes include a number of survey articles based on these lectures, along with expository articles and research papers by participants of the programs.

Théorie des groupes et généralisations

Yakov Berkovich, Zvonimir Janko. — **Groups of prime power order. Volume 4**. — De Gruyter expositions in mathematics, vol. 61. — Un vol. relié, 17,5×24, de XVI, 458 p. — ISBN 978-3-11-028145-3. — Prix: €159.95. — De Gruyter, Berlin/Boston, 2016.

Yakov Berkovich, Zvonimir Janko. — **Groups of prime power order. Volume 5**. — De Gruyter expositions in mathematics, vol. 62. — Un vol. relié, 17×24, de XX, 411 p. — ISBN 978-3-11-029534-4. — Prix: €159.99. — De Gruyter, Berlin/Boston, 2016.

This are the fourth and fifth volume of a comprehensive and elementary treatment of finite p-group theory. As in the previous volumes, minimal nonabelian p-groups play an important role. Topics covered in the fourth volume include: subgroup structure of metacyclic p-groups, Ishikawa's theorem on p-groups with two sizes of conjugate classes, p-central p-groups, theorem of Kegel on nilpotence of H_p-groups, partitions of p-groups, characterizations of Dedekindian groups, norm of p-groups, p-groups with 2-uniserial subgroups of small order. The fifth volume include theory of linear algebras and Lie algebras. Each book also contains hundreds of original exercises and solutions and a comprehensive list of more than 500 open problems. This work is suitable for researchers and graduate students with a modest background in algebra.

C.M. Campbell, M.R. Quick, E.F. Robertson, C.M. Roney-dougal, (Editors). — **Groups St Andrews 2013**. — London Mathematical Society lecture note series, vol. 422. — Un vol. broché, 15×23, de VII, 492 p. — ISBN 978-1-107-51454-6. — Prix: £65.00. — Cambridge University Press, Cambridge, 2015.

Every four years, leading researchers gather to survey the latest developments in all aspects of group theory. Since 1981, the proceedings of those meetings have provided a regular snapshot of the state of the art in group theory and helped to shape the direction of research in the field. This volume contains selected papers from the 2013 meeting held in St Andrews. It begins with major articles from each of the four main speakers: Emmanuel Breuillard (Paris-Sud), Martin Liebeck (Imperial College London), Alan Reid (Texas) and Karen Vogtmann (Cornell). These are followed by, in alphabetical order, survey articles contributed by other conference participants, which cover a wide spectrum of modern group theory.

Eric Jespers, Ángel del Río. — **Group ring groups. Volume 1: Orders and generic constructions of units**. — De Gruyter graduate. — Un vol. broché, 17×24, de XII, 447 p. — ISBN 978-3-11-037278-6. — Prix: €44.00. — De Gruyter, Berlin/Boston, 2016.

This two-volume graduate textbook gives a comprehensive, state-of-the-art account of describing large subgroups of the unit group of the integral group ring of a finite group and, more generally, of the unit group of an order in a finite dimensional semisimple rational algebra. Since the book is addressed to graduate students as well as young researchers, all required background on these diverse areas, both old and new, is included. Supporting problems illustrate the results and complete some of the proofs. Volume 1 contains all the details on describing generic constructions of units and the subgroup they generate. Volume 2 mainly is about structure theorems and geometric methods. Without being encyclopaedic, all main results and techniques used to achieve these results are included. Basic courses in group theory, ring theory and field theory are assumed as background.

Saul-Paul Sirag. — **ADEX theory : how the ADE Coxeter graphs unify mathematics and physics**. — Series on knots and everything, vol. 57. — Un vol. relié, 16×24, de X, 259 p. — ISBN 978-981-4656-49-8. — Prix: £95.00. — World Scientific, Hackensack, 2016.

This book shows how the ADE Coxeter graphs unify at least 20 different types of mathematical structures. These mathematical structures are of great utility in unified field theory, string theory, and other areas of physics. Content: Introduction, the octahedral group, the octahedral double group, the McKay correspondence, Lie groups and Lie algebras, Coxeter's reflection groups, Thom-Arnold catastrophe structures, ALE spaces and gravitational instantons, knots and links and braids, twistors and ALE spaces, two-dimensional conformal field theories, elliptic curves and the monster group, sphere packing and error-correcting codes, qubits and black holes, the holographic principle, Calabi-Yau spaces and mirror symmetry, Heisenberg algebras.

Groupes topologiques, groupes et algèbres de Lie

Brian HALL. — **Lie groups, Lie algebras, and representations: an elementary introduction**. — Second edition. — Graduate texts in mathematics, vol. 222. — Un vol. relié, 16×24, de XIII, 449 p. — ISBN 978-3-319-13466-6. — Prix: SFr. 68.00. — Springer, Cham, 2015.

This textbook treats Lie groups, Lie algebras and their representations in an elementary but fully rigorous fashion requiring minimal prerequisites. In particular, the theory of matrix Lie groups and their Lie algebras is developed using only linear algebra, and more motivation and intuition for proofs is provided than in most classic texts on the subject. In addition to its accessible treatment of the basic theory of Lie groups and Lie algebras, the book is also noteworthy for including: a treatment of the Baker–Campbell–Hausdorff formula and its use in place of the Frobenius theorem to establish deeper results about the relationship between Lie groups and Lie algebras motivation for the machinery of roots, weights and the Weyl group via a concrete and detailed exposition of the representation theory of $SL(3, \mathbf{C})$ an unconventional definition of semisimplicity that allows for a rapid development of the structure theory of semisimple Lie algebras a self-contained construction of the representations of compact groups, independent of Lie-algebraic arguments. The second edition of *Lie groups, Lie algebras, and representations* contains many substantial improvements and additions, among them: an entirely new part devoted to the structure and representation theory of compact Lie groups; a complete derivation of the main properties of root systems; the construction of finite-dimensional representations of semisimple Lie algebras has been elaborated; a treatment of universal enveloping algebras, including a proof of the Poincaré-Birkhoff-Witt theorem and the existence of Verma modules; complete proofs of the Weyl character formula, the Weyl dimension formula and the Kostant multiplicity formula.

Fonctions de variables réelles

Khavtgai NAMSRAI. — **Universal formulas in integral and fractional differential calculus**. — Un vol. relié, 18×25, de XV, 279 p. — ISBN 978-981-4675-59-8. — Prix: £63.00. — World Scientific, Singapore, 2016.

This reference book presents unique and traditional analytic calculations, and features more than a hundred universal formulas where one can calculate by hand enormous numbers of definite integrals, fractional derivatives and inverse operators. Despite the great success of numerical calculations due to computer technology, analytical calculations still play a vital role in the study of new, as yet unexplored, areas of mathematics, physics and other branches of sciences. Readers, including non-specialists, can obtain themselves universal formulas and define new special functions in integral and series representations by using the methods expounded in this book. This applies to anyone utilizing analytical calculations in their studies.

Équations aux dérivées partielles

Mikhail S. AGRANOVICH. — **Sobolev spaces, their generalizations, and elliptic problems in smooth and Lipschitz domains**. — Springer monographs in mathematics. — Un vol. relié, 16×24, de XIII, 331 p. — ISBN 978-3-319-14647-8. — Prix: SFr. 126.50. — Springer, Cham, 2015.

This book, which is based on several courses of lectures given by the author at the Independent University of Moscow, is devoted to Sobolev-type spaces and boundary value problems for linear elliptic partial differential equations. Its main focus is on problems in non-smooth (Lipschitz) domains for strongly elliptic systems. The author, who is a prominent expert in the theory of linear partial differential equations, spectral theory and pseudodifferential operators, has included his own very recent findings in the present book. It is well suited as a modern graduate textbook, utilizing a thorough and clear format that strikes a good balance between the choice of material and the style of exposition. It can be used both as an introduction to recent advances in elliptic equations and boundary value problems and as a valuable survey

and reference work. It also includes a good deal of new and extremely useful material not available in standard textbooks to date. Graduate and post-graduate students, as well as specialists working in the fields of partial differential equations, functional analysis, operator theory and mathematical physics will find this book particularly valuable.

Systèmes dynamiques et théorie ergodique

Thomas HAGEN, Florian RUPP, Jürgen SCHEURLE, (Editors). — **Dynamical systems, number theory and applications: a Festschrift in honor of Armin Leutbecher's 80th birthday**. — Un vol. relié, 17×25, de XII, 266 p. — ISBN 978-981-4699-86-0. — Prix: £82.00. — World Scientific, New Jersey, 2016.

This volume consists of a selection of research-type articles on dynamical systems, evolution equations, analytic number theory and closely related topics. A strong emphasis is on a fair balance between theoretical and more applied work, thus spanning the chasm between abstract insight and actual application. Several of the articles are expected to be in the intersection of dynamical systems theory and number theory. One article will likely relate the topics presented to the academic achievements and interests of Prof. Leutbecher and shed light on common threads among all the contributions.

Marcelo VIANA, Krerley OLIVEIRA. — **Foundations of ergodic theory**. — Cambridge studies in advanced mathematics, vol. 151. — Un vol. relié, 15,5×23,5, de XVI, 530 p. — ISBN 978-1-107-12696-1. — Prix: £79.99. — Cambridge University Press, Cambridge, 2016.

Rich with examples and applications, this textbook provides a coherent and self-contained introduction to ergodic theory, suitable for a variety of one- or two-semester courses. The authors' clear and fluent exposition helps the reader to grasp quickly the most important ideas of the theory, and their use of concrete examples illustrates these ideas and puts the results into perspective. The book requires few prerequisites, with background material supplied in the appendix. The first four chapters cover elementary material suitable for undergraduate students – invariance, recurrence and ergodicity – as well as some of the main examples. The authors then gradually build up to more sophisticated topics, including correlations, equivalent systems, entropy, the variational principle and thermodynamical formalism. The 400 exercises increase in difficulty through the text and test the reader's understanding of the whole theory. Hints and solutions are provided at the end of the book.

Transformations intégrales, calcul opérationnel

Boris RUBIN. — **Introduction to Radon transforms: with elements of fractional calculus and harmonic analysis**. — Encyclopedia of mathematics and its applications, vol. 160. — Un vol. relié, 16,5×25, de XVII, 576 p. — ISBN 978-0-521-85459-7. — Prix: US$155.00. — Cambridge University Press, New York, 2015.

The Radon transform represents a function on a manifold by its integrals over certain submanifolds. Integral transformations of this kind have a wide range of applications in modern analysis, integral and convex geometry, medical imaging, and many other areas. Reconstruction of functions from their Radon transforms requires tools from harmonic analysis and fractional differentiation. This comprehensive introduction contains a thorough exploration of Radon transforms and related operators when the basic manifolds are the real Euclidean space, the unit sphere, and the real hyperbolic space. Radon-like transforms are discussed not only on smooth functions but also in the general context of Lebesgue spaces. Applications, open problems, and recent results are also included. The book will be useful for researchers in integral geometry, harmonic analysis, and related branches of mathematics, including applications. The text contains many examples and detailed proofs, making it accessible to graduate students and advanced undergraduates.

Analyse fonctionnelle

Philippe BLANCHARD, Erwin BRÜNING. — **Mathematical methods in physics: distributions, Hilbert space operators, variational methods, and applications in quantum physics**. — Second edition. — Progress in mathematical physics, vol. 69. — Un vol. relié, 16×24, de XXVII, 597 p. — ISBN 978-3-319-14044-5. — Prix: SFr. 146.50. — Birkhäuser/Springer, Cham, 2015.

The second edition of this textbook presents the basic mathematical knowledge and skills that are needed for courses on modern theoretical physics, such as those on quantum mechanics, classical and quantum field theory, and related areas. The authors stress that learning mathematical physics is not a passive process and include numerous detailed proofs, examples, and over 200 exercises, as well as hints linking mathematical concepts and results to the relevant physical concepts and theories. All of the material from the first edition has been updated, and five new chapters have been added on such topics as distributions, Hilbert space operators, and variational methods. The text is divided into three parts. Part I is a brief introduction to distribution theory. Elements from the theories of ultra distributions and hyperfunctions are given in addition to some deeper results for Schwartz distributions, thus providing a rather comprehensive introduction to the theory of generalized functions. Basic properties and methods for distributions are developed with applications to constant coefficient ODEs and PDEs. The relation between distributions and holomorphic functions is considered, as well as basic properties of Sobolev spaces. Part II contains fundamental facts about Hilbert spaces. The basic theory of linear (bounded and unbounded) operators in Hilbert spaces and special classes of linear operators – compact, Hilbert–Schmidt, trace class, and Schrödinger operators, as needed in quantum physics and quantum information theory – are explored. This section also contains a detailed spectral analysis of all major classes of linear operators, including completeness of generalized eigenfunctions, as well as of (completely) positive mappings, in particular quantum operations. Part III treats the direct methods of the calculus of variations and their applications to boundary- and eigenvalue-problems for linear and nonlinear partial differential operators. The authors conclude with a discussion of the Hohenberg-Kohn variational principle. The appendices contain proofs of more general and deeper results, including completions, basic facts about metrizable Hausdorff locally convex topological vector spaces, Baire's fundamental results and their main consequences, and bilinear functionals. *Mathematical methods in physics* is aimed at a broad community of graduate students in mathematics, mathematical physics, quantum information theory, physics and engineering, as well as researchers in these disciplines. Expanded content and relevant updates will make this new edition a valuable resource for those working in these disciplines.

Vagn Lunsgaard HANSEN. — **Functional analysis: entering Hilbert space**. — Second edition. — Un vol. relié, 16×24, de XVI, 176 p. — ISBN 978-981-4733-92-2. — Prix: £48.00. — World Scientific, New Jersey, 2016.

This book presents basic elements of the theory of Hilbert spaces and operators on Hilbert spaces, culminating in a proof of the spectral theorem for compact, self-adjoint operators on separable Hilbert spaces. It exhibits a construction of the space of p^{th} power Lebesgue integrable functions by a completion procedure with respect to a suitable norm in a space of continuous functions, including proofs of the basic inequalities of Hölder and Minkowski. The L^p-spaces thereby emerges in direct analogy with a construction of the real numbers from the rational numbers. This allows grasping the main ideas more rapidly. Other important Banach spaces arising from function spaces and sequence spaces are also treated. In this second edition, I have expanded the material on normed vector spaces and their operators presented in Chapter 1 to include proofs of the Open Mapping Theorem, the Closed Graph Theorem and the Hahn-Banach Theorem. The material on operators between normed vector spaces is further expanded in a new Chapter 6, which presents the basic elements of the theory of Fredholm operators on general Banach spaces, not only on Hilbert spaces. This requires that we develop the theory of dual operators between Banach spaces to replace the use of adjoint operators between Hilbert spaces. With the addition of the new material on normed vector spaces and their operators, the book can serve as a general introduction to functional analysis viewed as a theory of infinite dimensional linear spaces and linear operators acting on them.

Théorie des opérateurs

Tanja Eisner, Bálint Farkas, Markus Haase, Rainer Nagel. — **Operator theoretic aspects of ergodic theory**. — Graduate texts in mathematics, vol. 272. — Un vol. broché, 16×24, de XVIII, 628 p. — ISBN 978-3-319-16897-5. — Prix: SFr. 79.00. — Springer, Cham, 2015.

Stunning recent results by Host–Kra, Green-Tao, and others, highlight the timeliness of this systematic introduction to classical ergodic theory using the tools of operator theory. Assuming no prior exposure to ergodic theory, this book provides a modern foundation for introductory courses on ergodic theory, especially for students or researchers with an interest in functional analysis. While basic analytic notions and results are reviewed in several appendices, more advanced operator theoretic topics are developed in detail, even beyond their immediate connection with ergodic theory. As a consequence, the book is also suitable for advanced or special-topic courses on functional analysis with applications to ergodic theory. Topics include an intuitive introduction to ergodic theory; an introduction to the basic notions, constructions, and standard examples of topological dynamical systems; Koopman operators, Banach lattices, lattice and algebra homomorphisms, and the Gelfand–Naimark theorem; measure-preserving dynamical systems; von Neumann's mean ergodic theorem and Birkhoff's pointwise ergodic theorem; strongly and weakly mixing systems; an examination of notions of isomorphism for measure-preserving systems; Markov operators, and the related concept of a factor of a measure-preserving system; compact groups and semigroups, and a powerful tool in their study, the Jacobs–de Leeuw–Glicksberg decomposition; an introduction to the spectral theory of dynamical systems; the theorems of Furstenberg and Weiss on multiple recurrence; and applications of dynamical systems to combinatorics (theorems of van der Waerden, Gallai, and Hindman, Furstenberg's correspondence principle, theorems of Roth and Furstenberg–Sárközy). Beyond its use in the classroom, *Operator theoretic aspects of ergodic theory* can serve as a valuable foundation for doing research at the intersection of ergodic theory and operator theory.

Géométrie

Amol Sasane. — **Plain plane geometry**. — Un vol. broché, 15×23, de XVI, 269 p. — ISBN 978-981-4740-44-9. — Prix: £32.00. — World Scientific, New Jersey, 2016.

The book constitutes an elementary course on plane Euclidean geometry, pitched at pre-university or at advanced high school level. It is a concise book treating the subject axiomatically, but since it is meant to be a first introduction to the subject, excessive rigour is avoided, making it appealing to a younger audience as well. The aim is to cover the basics of the subject, while keeping the subject lively by means of challenging and interesting exercises. This makes it relevant also for students participating in mathematics circles and in mathematics olympiads. Each section contains several problems, which are not purely drill exercises, but are intended to introduce a sense of "play" in mathematics, and inculcate appreciation of the elegance and beauty of geometric results. There is an abundance of colour pictures illustrating results and their proofs. A section on hints and a further section on detailed solutions to all the exercises appear at the end of the book, making the book ideal also for self-study.

Ensembles convexes et inégalités géométriques

Johannes Kellendonk, Daniel Lenz, Jean Savinien, (Editors). — **Mathematics of aperiodic order**. — Progress in mathematics, vol. 309. — Un vol. relié, 16×24, de XI, 428 p. — ISBN 978-3-0348-0902-3. — Prix: SFr. 107.00. — Birkhäuser/Springer, Basel, 2015.

What is order that is not based on simple repetition, that is, periodicity? How must atoms be arranged in a material so that it diffracts like a quasicrystal? How can we describe aperiodically ordered systems mathematically? Originally triggered by the - later Nobel prize-winning - discovery of quasicrystals, the investigation of aperiodic order has since become a well-established and rapidly evolving field of mathematical research with close ties to a surprising variety of branches of mathematics and physics. This book offers an

overview of the state of the art in the field of aperiodic order, presented in carefully selected authoritative surveys. It is intended for non-experts with a general background in mathematics, theoretical physics or computer science, and offers a highly accessible source of first-hand information for all those interested in this rich and exciting field. Topics covered include the mathematical theory of diffraction, the dynamical systems of tilings or Delone sets, their cohomology and non-commutative geometry, the Pisot substitution conjecture, aperiodic Schrödinger operators, and connections to arithmetic number theory.

Géométrie différentielle

C.T.J Dodson, George Galanis, Efstathios Vassiliou. — **Geometry in a Fréchet context: a projective limit approach**. — London Mathematical Society lecture note series, vol. 428. — Un vol. broché, 15×23, de XII, 302 p. — ISBN 978-1-316-60195-2. — Prix: £55.00. — Cambridge University Press, Cambridge, 2016.

Many geometrical features of manifolds and fibre bundles modelled on Fréchet spaces either cannot be defined or are difficult to handle directly. This is due to the inherent deficiencies of Fréchet spaces; for example, the lack of a general solvability theory for differential equations, the non-existence of a reasonable Lie group structure on the general linear group of a Fréchet space, and the non-existence of an exponential map in a Fréchet–Lie group. In this book, the authors describe in detail a new approach that overcomes many of these limitations by using projective limits of geometrical objects modelled on Banach spaces. It will appeal to researchers and graduate students from a variety of backgrounds with an interest in infinite-dimensional geometry. The book concludes with an appendix outlining potential applications and motivating future research.

Yong-Geun Oh. — **Symplectic topology and Floer homology. Volume 2: Floer homology and its applications**. — New mathematical monographs, vol. 29. — Un vol. relié, 15,5×23,5, de XXIII, 446 p. — ISBN 978-1-107-10967-4. — Prix: £89.99. — Cambridge University Press, Cambridge, 2015.

Published in two volumes, this is the first book to provide a thorough and systematic explanation of symplectic topology, and the analytical details and techniques used in applying the machinery arising from Floer theory as a whole. Volume 2 provides a comprehensive introduction to both Hamiltonian Floer theory and Lagrangian Floer theory, including many examples of their applications to various problems in symplectic topology. The first volume covered the basic materials of Hamiltonian dynamics and symplectic geometry and the analytic foundations of Gromov's pseudoholomorphic curve theory. *Symplectic topology and Floer homology* is a comprehensive resource suitable for experts and newcomers alike.

Topologie générale

Min Yan. — **Introduction to topology**. — De Gruyter graduate. — Un vol. broché, 17×24, de X, 239 p. — ISBN 978-3-11-037815-3. — Prix: €29.95. — Higher Education Press/De Gruyter, Berlin/Boston, 2016.

The aim of this book is to give a broad introduction of topology to undergraduate students. It covers the most important and useful parts of the point-set as well as the combinatorial topology. The development of the material is from simple to complex, concrete to abstract, and appeals to the intuition of readers. Attention is also paid to how topology is actually used in the other fields of mathematics. Over 150 illustrations, 160 examples and 600 exercises will help readers to practice and fully understand the subject. Covers point set topology and combinatorial topology; – contains abundant examples and exercises to facilitate the study; – entry level textbook, allowing easy access to the topic.

Topologie algébrique

Steven H. Weintraub. — **Fundamentals of algebraic topology**. — Graduate texts in mathematics, vol. 270. — Un vol. relié, 16×24, de X, 163 p. — ISBN 978-1-4939-1843-0. — Prix: US$69.99. — Springer, New York, 2014.

This rapid and concise presentation of the essential ideas and results of algebraic topology follows the axiomatic foundations pioneered by Eilenberg and Steenrod. The approach of the book is pragmatic: while most proofs are given, those that are particularly long or technical are omitted, and results are stated in a form that emphasizes practical use over maximal generality. Moreover, to better reveal the logical structure of the subject, the separate roles of algebra and topology are illuminated. Assuming a background in point-set topology, *Fundamentals of algebraic topology* covers the canon of a first-year graduate course in algebraic topology: the fundamental group and covering spaces, homology and cohomology, CW complexes and manifolds, and a short introduction to homotopy theory. Readers wishing to deepen their knowledge of algebraic topology beyond the fundamentals are guided by a short but carefully annotated bibliography.

Topologie des variétés, analyse globale et analyse des variétés

Yuli Rudyak. — **Piecewise linear structures on topological manifolds**. — Un vol. relié, 16×24, de XXII, 106 p. — ISBN 978-981-4733-78-6. — Prix: £68.00. — World Scientific, Singapore, 2016.

The study of triangulations of topological spaces has always been at the root of geometric topology. Among the most studied triangulations are piecewise linear triangulations of high-dimensional topological manifolds. Their study culminated in the late 1960s–early 1970s in a complete classification in the work of Kirby and Siebenmann. It is this classification that we discuss in this book, including the celebrated Hauptvermutung and triangulation conjecture. The goal of this book is to provide a readable and well-organized exposition of the subject, which would be suitable for advanced graduate students in topology. An exposition like this is currently lacking.

Stephen Bruce Sonzt. — **Principal bundles: the quantum case**. — Universitext. — Un vol. broché, 15,5×23,5, de XV, 350 p. — ISBN 978-3-319-15828-0. — Prix: SFr. 80.00. — Springer, Cham, 2015.

This introductory text is the first book about quantum principal bundles and their quantum connections which are natural generalizations to non-commutative geometry of principal bundles and their connections in differential geometry. To make for a more self-contained book there is also much background material on Hopf algebras, (covariant) differential calculi, braid groups and compatible conjugation operations. The approach is slow paced and intuitive in order to provide researchers and students in both mathematics and physics ready access to the material.

Rubén Vigara, Álvaro Lozano Rojo. — **Representing 3-manifolds by filling Dehn surfaces**. — Series on knots and everything, vol. 58. — Un vol. relié, 15,5×23,5, de XVII, 276 p. — ISBN 978-981-4725-48-4. — Prix: £110.00. — World Scientific, New Jersey, 2016.

This invaluable book provides an introduction to the beautiful and deep subject of filling Dehn surfaces in the study of topological 3-manifolds. This book presents, for the first time in English and with all the details, the results from the PhD thesis of the first author, together with some more recent results in the subject. It also presents some key ideas on how these techniques could be used on other subjects. *Representing 3-manifolds by filling Dehn surfaces* is mostly self-contained requiring only basic knowledge on topology and homotopy theory. The complete and detailed proofs are illustrated with a set of more than 600 spectacular pictures, in the tradition of low-dimensional topology books. It is a basic reference for researchers in the area, but it can also be used as an advanced textbook for graduate students or even for adventurous undergraduates in mathematics. The book uses topological and combinatorial tools developed throughout the twentieth century making the volume a trip along the history of low-dimensional topology.

Probabilités et processus stochastiques

Samuel N. Cohen, Robert J. Elliott. — **Stochastic calculus and applications**. — Second edition. — Probability and its applications. — Un vol. relié, 16×24, de XXIII, 666 p. — ISBN 978-1-4939-2866-8. — Prix: US$89.99. — Birkhauser/Springer, New York, 2015.

Completely revised and greatly expanded, the new edition of this text takes readers who have been exposed to only basic courses in analysis through the modern general theory of random processes and stochastic integrals as used by systems theorists, electronic engineers and, more recently, those working in quantitative and mathematical finance. Building upon the original release of this title, this text will be of great interest to research mathematicians and graduate students working in those fields, as well as quants in the finance industry. New features of this edition include: End of chapter exercises; new chapters on basic measure theory and Backward SDEs; reworked proofs, examples and explanatory material; increased focus on motivating the mathematics; extensive topical index.

Andrei Khrennikov. — **Probability and randomness: quantum versus classical**. — Un vol. relié, 15,5×23,5, de XVI, 282 p. — ISBN 978-1-78326-796-5. — Prix: £98.00. — Imperial College Press, London / distributed by World Scientific, Singapore, 2016.

Creating a rigorous mathematical theory of randomness is far from being complete, even in the classical case. *Probability and randomness: quantum versus classical* rectifies this and introduces mathematical formalisms of classical and quantum probability and randomness with brief discussion of their interrelation and interpretational and foundational issues. The book presents the essentials of classical approaches to randomness, enlightens their successes and problems, and then proceeds to essentials of quantum randomness. Its wide-ranging and comprehensive scope makes it suitable for researchers in mathematical physics, probability and statistics at any level.

Statistique

Jayant V. Deshpande, Sudha G. Purohit. — **Lifetime data: statistical models and methods**. — Second edition. — Series on quality, reliability and engineering statistics, vol. 16. — Un vol. relié, 16×24, de VII, 293 p. — ISBN 978-981-4730-66-2. — Prix: £51.00. — World Scientific, New Jersey, 2016.

This book is meant for postgraduate modules that cover lifetime data in reliability and survival analysis as taught in statistics, engineering statistics and medical statistics courses. It is helpful for researchers who wish to choose appropriate models and methods for analyzing lifetime data. There is an extensive discussion on the concept and role of ageing in choosing appropriate models for lifetime data, with a special emphasis on tests of exponentiality. There are interesting contributions related to the topics of ageing, tests for exponentiality, competing risks and repairable systems. A special feature of this book is that it introduces the public domain R-software and explains how it can be used in computations of methods discussed in the book. This new edition includes new sections on frailty models and accelerated life time models. Many more illustrations and exercises are also included.

Victor M. Panaretos. — **Statistique pour mathématiciens : un premier cours rigoureux**. — Enseignement des mathématiques. — Un vol. broché, 16×24, de XII, 246 p. — ISBN 978-2-88915-149-3. — Prix : SFr. 45.00. — Presses polytechniques et universitaires romandes, Lausanne, 2016.

Cet ouvrage propose une introduction claire et rigoureuse aux méthodes et notions principales de la statistique inférentielle, dont l'apprentissage et la maîtrise sont indispensables à tous les étudiants en science. Tout spécialement conçu pour les étudiants en mathématiques suivant un premier cours de statistique, sa caractéristique disctinctive est qu'il maintient un niveau élémentaire et toujours didactique sans sacrifier à la rigueur mathématique. Il expose de manière pédagogique l'origine des concepts statistiques, et les inscrit dans un champ de compréhension global. Il se positionne clairement comme un ouvrage de statistique pour mathématiciens, à la différence des nombreux autres ouvrages en statistique mathématique : le but n'est pas de traiter les aspects plutôt théoriques de la statistique, mais de procurer une introduction méthodologique

exempte de recettes, de résultats sans démonstration ou de formules toute faites. Une nouvelle référence dans son domaine, augmentée de nombreux exercices résolus d'auto-évaluation.

Analyse numérique

Paul W. Eloe, Johnny Henderson. — **Nonlinear interpolation and boundary value problems**. — Trends in abstract and applied analysis, vol. 2. — Un vol. relié, 16×24, de XII, 236 p. — ISBN 978-981-4733-47-2. — Prix: £76.00. — World Scientific, Singapore, 2016.

This book is devoted to the study of boundary value problems for nonlinear ordinary differential equations and focuses on questions related to the study of nonlinear interpolation. In 1967, Andrzej Lasota and Zdzisław Opial showed that, under suitable hypotheses, if solutions of a second-order nonlinear differential equation passing through two distinct points are unique, when they exist, then, in fact, a solution passing through two distinct points does exist. That result, coupled with the pioneering work of Philip Hartman on what was then called unrestricted n-parameter families, has stimulated 50 years of development in the study of solutions of boundary value problems as nonlinear interpolation problems. The purpose of this book is two-fold. First, the results that have been generated in the past 50 years are collected for the first time to produce a comprehensive and coherent treatment of what is now a well-defined area of study in the qualitative theory of ordinary differential equations. Second, methods and technical tools are sufficiently exposed so that the interested reader can contribute to the study of nonlinear interpolation.

Informatique

Wen Shen. — **An introduction to numerical computation**. — Un vol. relié, 18×25, de XII, 255 p. — ISBN 978-981-4730-06-8. — Prix: £51.00. — World Scientific, New Jersey, 2016.

Developed during ten years of teaching experience, this book serves as a set of lecture notes for an introductory course on numerical computation, at the senior undergraduate level. These notes contain the material that can be covered in a semester, together with a few optional sections for additional reading. Rather than surveying a large number of algorithms, the book presents the most important computational methods and emphasizes the underlying mathematical ideas. In most chapters, graphs and drawings are relied on, to build up intuition. The notes are written in a rather colloquial style, presenting the subject matter in the same form as it can be explained in a classroom. For instructors, this will minimize the amount of effort required to prepare their blackboard presentations. As prerequisites, the book only relies on standard calculus, an introductory course on matrices, and some basic computer programming skills. As a new feature, these notes are supplemented by two sets of videos from the author's Youtube channel. These videos contain a complete set of live lectures given in Spring 2015, together with a complete set of short tutorials, from 5 to 15 minutes each. A set of homework problems is included at the end of each chapter. Homework projects cover a variety of applications, in connection with population dynamics, engineering, mechanics, image reconstruction, etc. A complete set of solutions is available for instructors, upon request.

Mécanique des particules et systèmes

Dong Eui Chang, Darryl D. Holm, George Patrick, Tudor Ratiu, (Editors). — **Geometry, mechanics, and dynamics: the legacy of Jerry Marsden**. — Fields Institute communications, vol. 73. — Un vol. relié, 16×24, de VIII, 506 p. — ISBN 978-1-4939-2440-0. — Prix: US$129.00. — Springer, New York, 2015.

This book illustrates the broad range of Jerry Marsden's mathematical legacy in areas of geometry, mechanics, and dynamics, from very pure mathematics to very applied, but always with a geometric perspective. Each contribution develops its material from the viewpoint of geometric mechanics beginning at the very foundations, introducing readers to modern issues via illustrations in a wide range of topics. The twenty refereed papers contained in this volume are based on lectures and research performed during

the month of July 2012 at the Fields Institute for Research in Mathematical Sciences, in a program in honor of Marsden's legacy. The unified treatment of the wide breadth of topics treated in this book will be of interest to both experts and novices in geometric mechanics. Experts will recognize applications of their own familiar concepts and methods in a wide variety of fields, some of which they may never have approached from a geometric viewpoint. Novices may choose topics that interest them among the various fields and learn about geometric approaches and perspectives toward those topics that will be new for them as well.

Mécanique des solides, élasticité et plasticité

Alexander M. Formalskii. — **Stabilisation and motion control of unstable objects**. — De Gruyter studies in mathematical physics, vol. 33. — Un vol. relié, 17,5×24,5, de XVI, 236 p. — ISBN 978-3-11-037582-4. — Prix: €119.95. — De Gruyter, Berlin/Boston, 2015.

Systems with mechanical degrees of freedom containing unstable objects are analysed in this monograph and algorithms for their control are developed, discussed, and numerically tested. This is achieved by identifying unstable modes of motion and using all available resources to suppress them. By using this approach the region of states from which a stable regime can be reached is maximised. The systems discussed in this book are models for pendula and vehicles and find applications in mechatronics, robotics as well as in mechanical and automotive engineering.

Mécanique des fluides, acoustique

Shaun Bullett, Tom Fearn, Frank Smith, (Editors). — **Fluid and solid mechanics**. — LTCC Advanced Mathematics Series, vol. 2. — Un vol. broché, 15×23, de VII, 217 p. — ISBN 978-1-78634-026-9. — Prix: £25.00. — World Scientific, New Jersey, 2016.

This book leads readers from a basic foundation to an advanced-level understanding of fluid and solid mechanics. 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 multi-deck theory, time-mean turbulent shear flows, non-linear free surface flows, and internal fluid dynamics. *Fluid and solid mechanics* is the second 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.

Économie, recherche opérationnelle, jeux

Stephen Schecter, Herbert Gintis. — **Game theory in action: an introduction to classical and evolutionary models**. — Un vol. broché, 17,5×25,5, de 274 p. — ISBN 978-0-691-16765-7. — Prix: US$39.95. — Princeton University Press, Princeton/Oxford, 2016.

Game theory in action is a textbook about using game theory across a range of real-life scenarios. From traffic accidents to the sex lives of lizards, Stephen Schecter and Herbert Gintis show students how game theory can be applied in diverse areas including animal behavior, political science, and economics. The book's examples and problems look at such fascinating topics as crime-control strategies, climate-change negotiations, and the power of the Oracle at Delphi. The text includes a substantial treatment of evolutionary game theory, where strategies are not chosen through rational analysis, but emerge by virtue of being successful. This is the side of game theory that is most relevant to biology; it also helps to explain how human societies evolve. Aimed at students who have studied basic calculus and some differential equations, *Game theory in action* is the perfect way to learn the concepts and practical tools of game theory.

Biologie et sciences du comportement

Sergio Rinaldi, Fabio Della Rossa, Fabio Dercole, Alessandra Gragnani, Pietro Landi. — **Modeling love dynamics**. — World scientific series on nonlinear science, series A, vol. 89. — Un vol. relié, 17,5×24,5, de XIV, 241 p. — ISBN 978-981-4696-31-9. — Prix: £63.00. — World Scientific, Singapore, 2016.

This book shows, for the very first time, how love stories – a vital issue in our lives – can be tentatively described with classical mathematics. Focus is on the derivation and analysis of reliable models that allow one to formally describe the expected evolution of love affairs from the initial state of indifference to the final romantic regime. The models are in full agreement with the basic philosophical principles of love psychology. Eight chapters are theoretically oriented and discuss the romantic relationships between important classes of individuals identified by particular psychological traits. The remaining chapters are devoted to case studies described in classical poems or in worldwide famous films.

Systèmes, contrôle

Wim Michiels, Silviu-Iulian Niculescu. — **Stability, control, and computation for time-delay systems: an eigenvalue-based approach**. — Second edition. — Advances in design and control, vol. 27. — Un vol. broché, 17,5×25,5, de XXIII, 435 p. — ISBN 978-1-611973-62-4. — Prix: US$114.00. — SIAM, Philadelphia, 2014.

Time delays are important components of many systems in, for instance, engineering, physics, economics, and the life sciences, because the transfer of material, energy, and information is usually not instantaneous. Time delays may appear as computation and communication lags, they model transport phenomena and heredity, and they arise as feedback delays in control loops. This monograph addresses the problem of stability analysis, stabilization, and robust fixed-order control of dynamical systems subject to delays, including both retarded- and neutral-type systems. Within the eigenvalue-based framework, an overall solution is given to the stability analysis, stabilization, and robust control design problem, using both analytical methods and numerical algorithms and applicable to a broad class of linear time-delay systems. In this revised edition, the authors make the leap from stabilization to the design of robust and optimal controllers and from retarded-type to neutral-type delay systems, thus enlarging the scope of the book within control; include new, state-of-the-art material on numerical methods and algorithms to broaden the book's focus and to reach additional research communities, in particular numerical linear algebra and numerical optimization; and increase the number and range of applications to better illustrate the effectiveness and generality of their approach.

Information, communication, circuits

Roe W. Goodman. — **Discrete Fourier and wavelet transforms: an introduction through linear algebra with applications to signal processing**. — Un vol. broché, 17×25, de XII, 288 p. — ISBN 978-981-4725-77-4. — Prix: £65.00. — World Scientific, New Jersey, 2016.

This textbook for undergraduate mathematics, science, and engineering students introduces the theory and applications of discrete Fourier and wavelet transforms using elementary linear algebra, without assuming prior knowledge of signal processing or advanced analysis. It explains how to use the Fourier matrix to extract frequency information from a digital signal and how to use circulant matrices to emphasize selected frequency ranges. It introduces discrete wavelet transforms for digital signals through the lifting method and illustrates through examples and computer explorations how these transforms are used in signal and image processing. Then the general theory of discrete wavelet transforms is developed via the matrix algebra of two-channel filter banks. Finally, wavelet transforms for analog signals are constructed based on filter bank results already presented, and the mathematical framework of multiresolution analysis is examined.