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Bulletin bibliographique

It has been decided that this Bulletin bibliographique will not be pursued in later issues of *l'Enseignement Mathématique*.

Généralités

Etienne Barilier. — **Leonhard Euler : la clarté de l'esprit**. — Savoir suisse. — Un vol. broché, 12×18, de VII, 164 p. — ISBN 978-2-88915-252-0. — Prix : SFr. 17.50. — Presses polytechniques universitaires romandes, Lausanne, 2018.

Le public suisse le connaît mal. Tout au plus se souvient-on de son visage sur l'ancien billet de 10 francs. Mais pour les mathématiciens, à commencer par son célèbre contemporain Pierre-Simon de Laplace, « il s'agit de notre maître à tous ». Près de 80 objets mathématiques portent son nom : équations, angles, théorème, constante … Leonhard Euler (1707–1783) a donné un formidable coup d'accélérateur au savoir de son temps, depuis la physique jusqu'à l'astronomie, en passant par la dynamique des fluides et l'optique. Mais au-delà des nombres, l'homme apparaît comme un génie des Lumières, et l'ouvrage d'Étienne Barilier livre la passionnante trajectoire de cet érudit précoce et prolifique, depuis son enfance dans une famille de pasteur à Bâle et Riehen, jusqu'à sa mort à Saint-Pétersbourg.

Michel Deruaz, Stéphane Clivaz. — **Des mathématiques pour enseigner à l'école primaire**. — Un livre broché, 19×24, de 287 p. — ISBN 978-2-88915-260-5. — Prix : SFr. 32.00. — Presses polytechniques et universitaires romandes, Lausanne, 2018.

L'objectif de cet ouvrage de mathématiques est de permettre aux enseignantes et aux enseignants de reconsidérer les connaissances transmises durant les premières années de la scolarité. Il permet en quelque sorte de « ré-apprendre ce que l'on sait déjà », afin de l'enseigner avec davantage de relief. L'ouvrage traite des ensembles et de la logique, de la géométrie, des grandeurs et de la mesure ainsi que des notions de repérage, des nombres et des opérations, de l'écriture des nombres et des calculs qu'il est possible d'effectuer. Il s'attache également aux fonctions et à la proportionnalité, et, en appendice, à l'écriture des nombres et des opérations dans des bases autres que celle de dix. Augmentée de centaines d'illustrations et schémas en couleur, cette référence s'adresse en premier lieu aux enseignants de l'école primaire. Sa lecture ne requiert aucune connaissance en mathématiques autres que celles de l'école obligatoire ; celle-ci peut s'effectuer de façon linéaire, ou isolément, chapitre par chapitre.

Jérôme Gavin, Alain Schärlig. — **Sept pères du calcul écrit : des chiffres romains aux chiffres arabes 799 - 1202 - 1619**. — Un vol. broché, 16×24, de 146 p. — ISBN 978-2-88915-278-0. — Prix : SFr. 29.00. — Presses polytechniques et universitaires romandes, Lausanne, 2018.

On a peine à le croire, mais c'est la réalité : jusqu'aux débuts de la Renaissance, aucun comptable ou commerçant de chez nous ne pouvait effectuer une addition par écrit ; tout simplement parce qu'il ne disposait que des chiffres romains, et que ceux-ci ne se prêtent pas au calcul écrit. Il devait s'installer à une table de compte, et y représenter ses montants par des jetons, qu'il déplaçait sur des lignes ou dans des colonnes. Ce qui a tout changé, c'est l'arrivée des chiffres arabes. Car eux permettent le calcul écrit. Et pas seulement l'addition, mais tout ce que nous entendons par calcul élémentaire. La transition a pris des dizaines d'années, amorcée ici et là par un auteur courageux désireux de faire connaître le nouveau

calcul. Et devenu ainsi, dans sa langue et dans son pays, un père du calcul écrit. C'est aux plus marquants de ces auteurs que l'on rend ici hommage, dans un livre qui veut être agréable comme une promenade : on y expose brièvement leur vie, et l'on y commente pour chacun d'eux cinq problèmes très simples, tirés de l'ouvrage par lequel il a ouvert la voie. C'est l'occasion d'évoquer au passage un travers moderne, le syndrome du rétroviseur, qui brouille parfois l'image qu'on se fait du calcul écrit à ses débuts.

Šaraf al-Dīn AL-TŪSĪ. — **Oeuvres mathématiques : algèbres et géométrie au XIIe siècle**. — Anagôgê. — Deux vol. brochés, 15,5×24 — ISBN 9782251448619. — Prix : €97.00. — Les Belles Lettres, Paris, 2018.

Consacré à un moment décisif de l'histoire de l'algèbre, le présent ouvrage contient l'édition critique, la traduction française et le commentaire d'un sommet des mathématiques arabes : l'œuvre algébrique de Šaraf al-Dīn al-Tūsī (actif autour de 1170). En se fondant sur l'établissement rigoureux de toutes les sources disponibles et en replaçant cette œuvre dans son contexte historique et mathématique, Roshdi Rashed révèle comment son auteur tisse de nouveaux rapports entre algèbre et géométrie et porte la théorie des équations algébriques à un niveau qui ne sera dépassé que cinq siècles plus tard, avec Descartes et Fermat. À ce titre, ce livre est un ouvrage indispensable pour tous les historiens des mathématiques arabes – des mathématiques tout court. Initialement paru en 1986 et depuis trop longtemps indisponible, il a fait l'objet d'une relecture attentive à l'occasion de sa seconde édition.

Logique et fondements

John STILLWELL. — **Reverse mathematics: Proofs from the inside out**. — Un vol. relié, 16×24, de XIII, 182 p. — ISBN 9780691177175. — Prix: US$24.95. — Princeton University Press, Princeton/Oxford, 2018.

This book presents reverse mathematics to a general mathematical audience for the first time. Reverse mathematics is a new field that answers some old questions. In the two thousand years that mathematicians have been deriving theorems from axioms, it has often been asked: which axioms are needed to prove a given theorem? Only in the last two hundred years have some of these questions been answered, and only in the last forty years has a systematic approach been developed. In *Reverse mathematics*, John Stillwell gives a representative view of this field, emphasizing basic analysis – finding the "right axioms" to prove fundamental theorems – and giving a novel approach to logic. Stillwell introduces reverse mathematics historically, describing the two developments that made reverse mathematics possible, both involving the idea of arithmetization. The first was the nineteenth-century project of arithmetizing analysis, which aimed to define all concepts of analysis in terms of natural numbers and sets of natural numbers. The second was the twentieth-century arithmetization of logic and computation. Thus arithmetic in some sense underlies analysis, logic, and computation. Reverse mathematics exploits this insight by viewing analysis as arithmetic extended by axioms about the existence of infinite sets. Remarkably, only a small number of axioms are needed for reverse mathematics, and, for each basic theorem of analysis, Stillwell finds the "right axiom" to prove it. By using a minimum of mathematical logic in a well-motivated way, *Reverse mathematics* will engage advanced undergraduates and all mathematicians interested in the foundations of mathematics.

Théorie des nombres

Lior FISCHMAN, David SIMMONS, Marius URBANSKI. — **Diophantine approximation and the geometry of limit sets in Gromov hyperbolic metric spaces**. — Memoirs of the American Mathematical Society, vol. 1215. — Un vol. broché, 18×25,5, de V, 137 p. — ISBN 978-1-4704-2886-0. — Prix: US$78.00. — American Mathematical Society, Providence, 2018.

In this paper, the authors provide a complete theory of Diophantine approximation in the limit set of a group acting on a Gromov hyperbolic metric space. This summarizes and completes a long line of results by many authors, from Patterson's classic 1976 paper to more recent results of Hersonsky and Paulin (2002, 2004, 2007). The authors consider concrete examples of situations which have not been considered before. These include geometrically infinite Kleinian groups, geometrically finite Kleinian groups where the approximating point is not a fixed point of any element of the group, and groups acting on infinite-dimensional hyperbolic space. Moreover, in addition to providing much greater generality than any prior work of which the authors are aware, the results also give new insight into the nature of the connection between Diophantine approximation and the geometry of the limit set within which it takes place. Two results are also contained here which are purely geometric: a generalization of a theorem of Bishop and Jones (1997) to Gromov hyperbolic metric spaces, and a proof that the uniformly radial limit set of a group acting on a proper geodesic Gromov hyperbolic metric space has zero Patterson–Sullivan measure unless the group is quasiconvex-cocompact. The latter is an application of a Diophantine theorem.

Géométrie algébrique

Nero Budur, Tommaso De Fernex, Roi Docampo, Kevin Tucker, (Editors). — **Local and Global Methods in Algebraic Geometry: Conference in honor of Lawrence Ein's 60th birthday Local and Global Methods in Algebraic Geometry, May 12–15, 2016, University of Illinois at Chicago, Chicago Il.** — Contemporary mathematics, vol. 712. — Un vol. broché, 18×25, de XI, 355 p. — ISBN 978-1-4704-3488-5. — Prix: US$117.00. — American Mathematical Society, Providence, 2018.

This volume contains the proceedings of the conference Local and Global Methods in Algebraic Geometry, held from May 12–15, 2016, at the University of Illinois at Chicago, in honor of Lawrence Ein's 60th birthday. The articles cover a broad range of topics in algebraic geometry and related fields, including birational geometry and moduli theory, analytic and positive characteristic methods, geometry of surfaces, singularity theory, hyper-Kähler geometry, rational points, and rational curves.

Steven Dale Cutkosky. — **Introduction to algebraic geometry**. — Graduate studies in mathematics, vol. 188. — Un vol. relié, 18×26, de XII, 484 p. — ISBN 978-1-4704-3518-9. — Prix: US$83.00. — American Mathematical Society, Providence, 2018.

This book presents a readable and accessible introductory course in algebraic geometry, with most of the fundamental classical results presented with complete proofs. An emphasis is placed on developing connections between geometric and algebraic aspects of the theory. Differences between the theory in characteristic 0 and positive characteristic are emphasized. The basic tools of classical and modern algebraic geometry are introduced, including varieties, schemes, singularities, sheaves, sheaf cohomology, and intersection theory. Basic classical results on curves and surfaces are proved. More advanced topics such as ramification theory, Zariski's main theorem, and Bertini's theorems for general linear systems are presented, with proofs, in the final chapters. With more than 200 exercises, the book is an excellent resource for teaching and learning introductory algebraic geometry.

Antoine Ducros. — **Families of Berkovich spaces**. — Astérisque, vol. 400. — Un vol. broché, 17,5×24, de VII, 262 p. — ISBN 978-2-85629-885-5. — Prix: €50.00. — Astérisque, Paris, 2018.

This book investigates, roughly speaking, the variation of the properties of the fibers of a map between analytic spaces in the sense of Berkovich. First of all, we study flatness in this setting; the naive definition of this notion is not reasonable, we explain why and give another one. We then describe the loci of fiberwise validity of some usual properties (like being Cohen–Macaulay, Gorenstein, geometrically regular ...); we show that these are (locally) Zariski-constructible subsets of the source space. For that purpose, we develop systematic methods for "spreading out" in Berkovich geometry, as one does in scheme theory, some properties from a generic" fiber to a neighborhood of it.

Algèbre linéaire et multilinéaire, théorie des matrices

Larisa Beilina, Evgenii Karchevskii, Michail Karchevskii. — **Numerical linear algebra: theory and applications**. — Un vol. relié, 16×24, de XIV, 450 p. — ISBN 978-3-319-57302-1. — Prix: £71.91. — Springer Nature, Cham, 2018.

This book combines a solid theoretical background in linear algebra with practical algorithms for numerical solution of linear algebra problems. Developed from a number of courses taught repeatedly by the authors, the material covers topics like matrix algebra, theory for linear systems of equations, spectral theory, vector and matrix norms combined with main direct and iterative numerical methods, least squares problems, and eigenproblems. Numerical algorithms illustrated by computer programs written in MATLAB® are also provided as supplementary material on SpringerLink to give the reader a better understanding of professional numerical software for the solution of real-life problems. Perfect for a one- or two-semester course on numerical linear algebra, matrix computation, and large sparse matrices, this text will interest students at the advanced undergraduate or graduate level.

Anneaux et algèbres

Sebastiano Carpi, Yasuyuki Kawahigashi, Roberto Longo, Mihaly Weiner. — **From vertex operator algebras to conformal nets and back**. — Memoirs of the American Mathematical Society, vol. 1213. — Un vol. broché, 18×25,5, de VI, 85 p. — ISBN 978-1-4704-2858-7. — Prix: US$78.00. — American Mathematical Society, Providence, 2018.

The authors consider unitary simple vertex operator algebras whose vertex operators satisfy certain energy bounds and a strong form of locality and call them strongly local. They present a general procedure which associates to every strongly local vertex operator algebra V a conformal net A_V acting on the Hilbert space completion of V and prove that the isomorphism class of A_V does not depend on the choice of the scalar product on V. They show that the class of strongly local vertex operator algebras is closed under taking tensor products and unitary subalgebras and that, for every strongly local vertex operator algebra V, the map $W \mapsto A_W$ gives a one-to-one correspondence between the unitary subalgebras W of V and the covariant subnets of A_V.

Nguyen Tu Cuong, Le Tuan Hoa, Ngo Viet Trung, (Editors). — **Commutative algebra and its interactions to algebraic geometry VISAM 2013-2014**. — Lecture notes in mathematics, vol. 2210. — Un vol. relié, 18,5×26, de IX, 256 p. — ISBN 978-3-319-75564-9. — Prix: €67.59. — Springer Nature, Cham, 2018.

This book presents four lectures on recent research in commutative algebra and its applications to algebraic geometry. Aimed at researchers and graduate students with an advanced background in algebra, these lectures were given during the Commutative Algebra program held at the Vietnam Institute of Advanced Study in Mathematics in the winter semester 2013–2014. The first lecture is on Weyl algebras (certain rings of differential operators) and their D-modules, relating non-commutative and commutative algebra to algebraic geometry and analysis in a very appealing way. The second lecture concerns local systems, their homological origin, and applications to the classification of Artinian Gorenstein rings and the computation of their invariants. The third lecture is on the representation type of projective varieties and the classification of arithmetically Cohen -Macaulay bundles and Ulrich bundles. Related topics such as moduli spaces of sheaves, liaison theory, minimal resolutions, and Hilbert schemes of points are also covered. The last lecture addresses a classical problem: how many equations are needed to define an algebraic variety set-theoretically? It systematically covers (and improves) recent results for the case of toric varieties.

Théorie des groupes et généralisations

Cheryl E. Praeger, Csaba Schneider. — **Permutation groups and cartesian decompositions**. — London Mathematical Society lecture note series, vol. 449. — Un vol. broché, 15×23, de VII, 323 p. — ISBN 978-0-521-67506-2. — Prix: US$90.00. — Cambridge University Press, Cambridge, 2018.

Permutation groups, their fundamental theory and applications are discussed in this introductory book. It focuses on those groups that are most useful for studying symmetric structures such as graphs, codes and designs. Modern treatments of the O'Nan-Scott theory are presented not only for primitive permutation groups but also for the larger families of quasiprimitive and innately transitive groups, including several classes of infinite permutation groups. Their precision is sharpened by the introduction of a cartesian decomposition concept. This facilitates reduction arguments for primitive groups analogous to those, using orbits and partitions, that reduce problems about general permutation groups to primitive groups. The results are particularly powerful for finite groups, where the finite simple group classification is invoked. Applications are given in algebra and combinatorics to group actions that preserve cartesian product structures. Students and researchers with an interest in mathematical symmetry will find the book enjoyable and useful.

Fonctions de plusieurs variables complexes

Chin-Yu Hsiao. — **Szegő Kernel asymptotics for high power of CR line bundles and Kodaira embedding theorems on CR manifolds**. — Memoirs of the American Mathematical Society, vol. 1217. — Un vol. broché, 17,5×25, de V, 142 p. — ISBN 978-1-4704-4101-2. — Prix: US$78.00. — American Mathematical Society, Providence, 2018.

Let X be an abstract not necessarily compact orientable CR manifold of dimension $2n-1$, $n \geq 2$, and let L^k be the k-th tensor power of a CR complex line bundle L over X. Given $q \in \{0, 1, \ldots, n-1\}$, let $\Box_{b,k}^{(q)}$ be the Gaffney extension of Kohn Laplacian for $(0,q)$ forms with values in L^k. For $\lambda \geq 0$, let $\prod_{k,\leq\lambda}^{(q)} := E((-\infty, \lambda])$, where E denotes the spectral measure of $\Box_{b,k}^{(q)}$. In this work, the author proves that $\prod_{k,\leq k^{-N_0}}^{(q)} F_k^*, F_k \prod_{k,\leq k^{-N_0}}^{(q)} F_k^*, N_0 \geq 1$, admit asymptotic expansions with respect to k on the non-degenerate part of the characteristic manifold of $\Box_{b,k}^{(q)}$, where F_k is some kind of microlocal cut-off function. Moreover, we show that $F_k \prod_{k,\leq 0}^{(q)} F_k^*$ admits a full asymptotic expansion with respect to k if $\Box_{b,k}^{(q)}$ has small spectral gap property with respect to F_k and $\prod_{k,\leq 0}^{(q)}$ is k-negligible away the diagonal with respect to F_k. By using these asymptotics, the authors establish almost Kodaira embedding theorems on CR manifolds and Kodaira embedding theorems on CR manifolds with transversal CR S^1 action.

Équations aux dérivées partielles

Raphaël Danchin, Reinhard Farwig, Jiri Neustupa, Patrick Penel, (Editors). — **Mathematical Analysis in Fluid Mechanics: Selected Recent Results: International Conference on Vorticity, Rotation and Symmetry (IV)—Complex Fluids and the Issue of Regularity, May 8-12, 2017, Luminy, Marseille, France** . — Contemporary mathematics, vol. 710. — Un vol. broché, 18×25, de VIII, 242 p. — ISBN 978-1-4704-3646-9. — Prix: US$117.00. — American Mathematical Society, Providence, 2018.

This volume contains the proceedings of the International Conference on Vorticity, Rotation and Symmetry (IV) – Complex Fluids and the Issue of Regularity, held from May 8–12, 2017, in Luminy, Marseille, France. The papers cover topics in mathematical fluid mechanics ranging from the classical regularity issue for solutions of the 3D Navier-Stokes system to compressible and non-Newtonian fluids, MHD flows and mixtures of fluids. Topics of different kinds of solutions, boundary conditions, and interfaces are also discussed.

Dmitry Khavinson, Erik Lundberg. — **Linear holomorphic partial differential equations and classical potential theory**. — Mathematical surveys and monographs, vol. 232. — Un vol. relié, 18,5×25,5 de X, 214 p. — ISBN 978-1-4704-3780-0. — Prix: US$122.00. — American Mathematical Society, Providence, 2018.

Why do solutions of linear analytic PDE suddenly break down? What is the source of these mysterious singularities, and how do they propagate? Is there a mean value property for harmonic functions in ellipsoids similar to that for balls? Is there a reflection principle for harmonic functions in higher dimensions similar to the Schwarz reflection principle in the plane? How far outside of their natural domains can solutions of

the Dirichlet problem be extended? Where do the continued solutions become singular and why? This book invites graduate students and young analysts to explore these and many other intriguing questions that lead to beautiful results illustrating a nice interplay between parts of modern analysis and themes in "physical" mathematics of the nineteenth century. To make the book accessible to a wide audience including students, the authors do not assume expertise in the theory of holomorphic PDE, and most of the book is accessible to anyone familiar with multivariable calculus and some basics in complex analysis and differential equations.

Tai-Peng Tsai. — **Lectures on Navier-Stokes equations**. — Graduate studies in mathematics, vol. 192. — Un vol. broché, 18×26, de XII, 224 p. — ISBN 978-1-4704-3096-2. — Prix: US$83.00. — American Mathematical Society, Providence, 2018.

This book is a graduate text on the incompressible Navier-Stokes system, which is of fundamental importance in mathematical fluid mechanics as well as in engineering applications. The goal is to give a rapid exposition on the existence, uniqueness, and regularity of its solutions, with a focus on the regularity problem. To fit into a one-year course for students who have already mastered the basics of PDE theory, many auxiliary results have been described with references but without proofs, and several topics were omitted. Most chapters end with a selection of problems for the reader. After an introduction and a careful study of weak, strong, and mild solutions, the reader is introduced to partial regularity. The coverage of boundary value problems, self-similar solutions, the uniform $L3$ class including the celebrated Escauriaza-Seregin-Šverák Theorem, and axisymmetric flows in later chapters are unique features of this book that are less explored in other texts. The book can serve as a textbook for a course, as a self-study source for people who already know some PDE theory and wish to learn more about Navier-Stokes equations, or as a reference for some of the important recent developments in the area.

Systèmes dynamiques et théorie ergodique

Sébastien Ferenczi, Joanna Kulaga-przymus, Mariusz Lemanczyk. — **Ergodic theory and dynamical systems in their interactions, CIRM Jean-Morlet Chair, Fall 2016**. — Lecture notes in mathematics, vol. 2213. — Un vol. broché, 15,5×23,5, de XIV, 431 p. — ISBN 978-3-319-74907-5. — Prix: €57.69. — Springer Nature, Cham, 2018.

This book concentrates on the modern theory of dynamical systems and its interactions with number theory and combinatorics. The greater part begins with a course in analytic number theory and focuses on its links with ergodic theory, presenting an exhaustive account of recent research on Sarnak's conjecture on Möbius disjointness. Selected topics involving more traditional connections between number theory and dynamics are also presented, including equidistribution, homogenous dynamics, and Lagrange and Markov spectra. In addition, some dynamical and number theoretical aspects of aperiodic order, some algebraic systems, and a recent development concerning tame systems are described.

Saeed Zakeri. — **Rotation sets and complex dynamics**. — Lecture notes in mathematics, vol. 2214. — Un vol. broché, 15,5×23,5, de XIII, 122 p. — ISBN 978-3-319-78810-4. — Prix: €46.79. — Springer Nature, Cham, 2018.

This monograph examines rotation sets under the multiplication by d (mod 1) map and their relation to degree d polynomial maps of the complex plane. These sets are higher-degree analogs of the corresponding sets under the angle-doubling map of the circle, which played a key role in Douady and Hubbard's work on the quadratic family and the Mandelbrot set. Presenting the first systematic study of rotation sets, treating both rational and irrational cases in a unified fashion, the text includes several new results on their structure, their gap dynamics, maximal and minimal sets, rigidity, and continuous dependence on parameters. This abstract material is supplemented by concrete examples which explain how rotation sets arise in the dynamical plane of complex polynomial maps and how suitable parameter spaces of such polynomials provide a complete catalog of all such sets of a given degree. As a main illustration, the link between rotation sets of degree 3 and one-dimensional families of cubic polynomials with a persistent indifferent fixed point is outlined. The monograph will benefit graduate students as well as researchers in the area of holomorphic dynamics and related fields.

Analyse fonctionnelle

Theo Buhler, Dietmar A. Salamon. — **Functional analysis**. — Graduate studies in mathematics, vol. 191. — Un vol. relié, 18,5×26, de XIV, 466 p. — ISBN 978-1-4704-4190-6. — Prix: US$83.00. — American Mathematical Society, Providence, 2018.

Functional analysis is a central subject of mathematics with applications in many areas of geometry, analysis, and physics. This book provides a comprehensive introduction to the field for graduate students and researchers. It begins in Chapter 1 with an introduction to the necessary foundations, including the Arzelà–Ascoli theorem, elementary Hilbert space theory, and the Baire Category Theorem. Chapter 2 develops the three fundamental principles of functional analysis (uniform boundedness, open mapping theorem, Hahn-Banach theorem) and discusses reflexive spaces and the James space. Chapter 3 introduces the weak and weak* topologies and includes the theorems of Banach-Alaoglu, Banach-Dieudonné, Eberlein-Šmulyan, Krein–Milman, as well as an introduction to topological vector spaces and applications to ergodic theory. Chapter 4 is devoted to Fredholm theory. It includes an introduction to the dual operator and to compact operators, and it establishes the closed image theorem. Chapter 5 deals with the spectral theory of bounded linear operators. It introduces complex Banach and Hilbert spaces, the continuous functional calculus for self-adjoint and normal operators, the Gelfand spectrum, spectral measures, cyclic vectors, and the spectral theorem. Chapter 6 introduces unbounded operators and their duals. It establishes the closed image theorem in this setting and extends the functional calculus and spectral measure to unbounded self-adjoint operators on Hilbert spaces. Chapter 7 gives an introduction to strongly continuous semigroups and their infinitesimal generators. It includes foundational results about the dual semigroup and analytic semigroups, an exposition of measurable functions with values in a Banach space, and a discussion of solutions to the inhomogeneous equation and their regularity properties. The appendix establishes the equivalence of the Lemma of Zorn and the Axiom of Choice, and it contains a proof of Tychonoff's theorem. With 10 to 20 elaborate exercises at the end of each chapter, this book can be used as a text for a one-or-two-semester course on functional analysis for beginning graduate students. Prerequisites are first-year analysis and linear algebra, as well as some foundational material from the second-year courses on point set topology, complex analysis in one variable, and measure and integration.

Fernando Galaz-garcia, Juan Carlos Pardo Millan, Perdro Solorzano, (Editors). — **Contributions of Mexican mathematicians abroad in pure and applied mathematics: Second Meeting Matemáticos Mexicanos en el Mundo, December 15–19, 2014, Centro de Investigación en Matemáticas, Guanajuato, Mexico**. — Contemporary mathematics, vol. 709. — Un vol. broché, 18×25, de XV, 158 p. — ISBN 978-1-4704-4286-6. — Prix: US$117.00. — American Mathematical Society, Providence, 2018.

This volume contains the proceedings of the Second Workshop of Mexican Mathematicians Abroad (II Reunión de Matemáticos Mexicanos en el Mundo), held from December 15–19, 2014, at Centro de Investigación en Matemáticas (CIMAT) in Guanajuato, Mexico. This meeting was the second in a series of ongoing biannual meetings aimed at showcasing the research of Mexican mathematicians based outside of Mexico. The book features articles drawn from eight broad research areas: algebra, analysis, applied mathematics, combinatorics, dynamical systems, geometry, probability theory, and topology. Their topics range from novel applications of non-commutative probability to graph theory, to interactions between dynamical systems and geophysical flows. Several articles survey the fields and problems on which the authors work, highlighting research lines currently underrepresented in Mexico. The research-oriented articles provide either alternative approaches to well-known problems or new advances in active research fields. The wide selection of topics makes the book accessible to advanced graduate students and researchers in mathematics from different fields.

Théorie des opérateurs

Sergey Bezuglyi, Palle E.T. Jorgensen. — **Transfer operators, endomorphisms, and measurable partitions**. — Lecture notes in mathematics, vol. 2217. — Un vol. broché, 15,5×23,5, de X, 160 p. — ISBN 978-3-319-92417-5. — Prix: €58.01. — Springer Nature, Cham, 2018.

The subject of this book stands at the crossroads of ergodic theory and measurable dynamics. With an emphasis on irreversible systems, the text presents a framework of multi-resolutions tailored for the study of endomorphisms, beginning with a systematic look at the latter. This entails a whole new set of tools, often quite different from those used for the "easier" and well-documented case of automorphisms. Among them is the construction of a family of positive operators (transfer operators), arising naturally as a dual picture to that of endomorphisms. The setting (close to one initiated by S. Karlin in the context of stochastic processes) is motivated by a number of recent applications, including wavelets, multi-resolution analyses, dissipative dynamical systems, and quantum theory. The automorphism-endomorphism relationship has parallels in operator theory, where the distinction is between unitary operators in Hilbert space and more general classes of operators such as contractions. There is also a non-commutative version: While the study of automorphisms of von Neumann algebras dates back to von Neumann, the systematic study of their endomorphisms is more recent; together with the results in the main text, the book includes a review of recent related research papers, some by the co-authors and their collaborators.

Ensembles convexes et inégalités géométriques

Semyon Alesker. — **Introduction to the theory of valuations**. — Conference board of the mathematical sciences CBMS. — CBMS Regional conference series in mathematics, vol. 126. — Un vol. broché, 18×25, de VI, 83 p. — ISBN 978-1-4704-4359-7. — Prix: €52.00. — American Mathematical Society, Providence, 2018.

A co-publication of the AMS and CBMS. Theory of valuations on convex sets is a classical part of convex geometry which goes back at least to the positive solution of the third Hilbert problem by M. Dehn in 1900. Since then the theory has undergone a multifaceted development. The author discusses some of Hadwiger's results on valuations on convex compact sets that are continuous in the Hausdorff metric. The book also discusses the Klain-Schneider theorem as well as the proof of McMullen's conjecture, which led subsequently to many further applications and advances in the theory. The last section gives an overview of more recent developments in the theory of translation-invariant continuous valuations, some of which turn out to be useful in integral geometry. This book grew out of lectures that were given in August 2015 at Kent State University in the framework of the NSF CBMS conference "Introduction to the Theory of Valuations on Convex Sets". Only a basic background in general convexity is assumed.

Topologie algébrique

Christian Ausoni, Kathryn Hess, Brenda Johnson, Leke Moerdijk, Jérôme Scherer, (Editors). — **An alpine bouquet of algebraic topology: Alpine Algebraic and Applied Topology Conference, August 15–21, 2016, Saas-Almagell, Switzerland**. — Contemporary mathematics, vol. 708. — Un vol. broché, 18×25, de XI, 308 p. — ISBN 978-1-4704-2911-9. — Prix: US$117.00. — American Mathematical Society, Providence, 2018.

This volume contains the proceedings of the Alpine Algebraic and Applied Topology Conference, held from August 15–21, 2016, in Saas-Almagell, Switzerland. The papers cover a broad range of topics in modern algebraic topology, including the theory of highly structured ring spectra, infinity-categories and Segal spaces, equivariant homotopy theory, algebraic K-theory and topological cyclic, periodic, or Hochschild homology, intersection cohomology, and symplectic topology.

David Chataur, Martinxo Saralegi-aranguren, Daniel Tanre. — **Intersection cohomology, simplicial blow-up and rational homotopy**. — Memoirs of the American Mathematical Society, vol. 1214. — Un vol. broché, 18×25,5, de VIII, 108 p. — ISBN 978-1-4704-2887-7. — Prix: US$78.00. — American Mathematical Society, Providence, 2018.

Let X be a pseudomanifold. In this text, the authors use a simplicial blow-up to define a cochain complex whose cohomology with coefficients in a field, is isomorphic to the intersection cohomology of X, introduced by M. Goresky and R. MacPherson. The authors do it simplicially in the setting of a filtered version of face sets, also called simplicial sets without degeneracies, in the sense of C.P. Rourke and B.J. Sanderson. They define perverse local systems over filtered face sets and intersection cohomology with coefficients in a perverse local system. In particular, as announced above when X is a pseudomanifold, the authors get a perverse local system of cochains quasi-isomorphic to the intersection cochains of Goresky and MacPherson, over a field. We show also that these two complexes of cochains are quasi-isomorphic to a filtered version of Sullivan's differential forms over the field Q. In a second step, they use these forms to extend Sullivan's presentation of rational homotopy type to intersection cohomology.

Topologie des variétés, analyse globale et analyse des variétés

Robert Lipshitz, Peter Ozvath, Dylan P. Thurston. — **Bordered Heegaard Floer homology**. — Memoirs of the American Mathematical Society, vol. 1216. — Un vol. broché, 18×25,5, de VIII, 279 p. — ISBN 978-1-4704-2888-4. — Prix: US$78.00. — American Mathematical Society, Providence, 2018.

The authors construct Heegaard Floer theory for 3-manifolds with connected boundary. The theory associates to an oriented, parametrized two-manifold a differential graded algebra. For a three-manifold with parametrized boundary, the invariant comes in two different versions, one of which (type D) is a module over the algebra and the other of which (type A) is an A_∞ module. Both are well-defined up to chain homotopy equivalence. For a decomposition of a 3-manifold into two pieces, the A_∞ tensor product of the type D module of one piece and the type A module from the other piece is $\widehat{HF}$ of the glued manifold. As a special case of the construction, the authors specialize to the case of three-manifolds with torus boundary. This case can be used to give another proof of the surgery exact triangle for $\widehat{HF}$. The authors relate the bordered Floer homology of a three-manifold with torus boundary with the knot Floer homology of a filling.

Jesús A. Alvarez Lopez, Alberto Candel. — **Generic coarse geometry of leaves**. — Lecture notes in mathematics, vol. 2223. — Un vol. relié, 15,5×23,5, de XV, 171 p. — ISBN 978-3-319-94131-8. — Prix: €63.29. — Springer Nature, Cham, 2018.

This book provides a detailed introduction to the coarse quasi-isometry of leaves of a foliated space and describes the cases where the generic leaves have the same quasi-isometric invariants. Every leaf of a compact foliated space has an induced coarse quasi-isometry type, represented by the coarse metric defined by the length of plaque chains given by any finite foliated atlas. When there are dense leaves either all dense leaves without holonomy are uniformly coarsely quasi-isometric to each other, or else every leaf is coarsely quasi-isometric to just meagerly many other leaves. Moreover, if all leaves are dense, the first alternative is characterized by a condition on the leaves called coarse quasi-symmetry. Similar results are proved for more specific coarse invariants, like growth type, asymptotic dimension, and amenability. The Higson corona of the leaves is also studied. All the results are richly illustrated with examples. The book is primarily aimed at researchers on foliated spaces. More generally, specialists in geometric analysis, topological dynamics, or metric geometry may also benefit from it.

Chris Wendl. — **Holomorphic curves in low dimensions: from symplectic ruled surfaces to planar contact manifolds**. — Lecture notes in mathematics, vol. 2216. — Un vol. broché, 15,5×23,5, de XIII, 292 p. — ISBN 978-3-319-91369-8. — Prix: €68.56. — Springer Nature, Cham, 2018.

Provides an up-to-date perspective on certain foundational results in 4-dimensional symplectic topology. Includes the first exposition aimed at graduate students on the classification of uniruled symplectic 4-

manifolds. Illustrates the connection between McDuff's classic results on rational/ruled surfaces and more recent developments involving symplectic fillings of contact 3-manifolds and the Weinstein conjecture. Offers a concise survey of the essential analytical results in the theory of punctured holomorphic curves.

Probabilités et processus stochastiques

Catherine Donati-martin, Antoine Lejay, Alain Roualt, (Editors). — **Séminaire de probabilités XLIX**. — Lecture notes in mathematics, vol. 2215. CIME Séminaire de probabilités. — Un vol. broché, 15,5×23,5, de VIII, 542 p. — ISBN 978-3-319-92419-9. — Prix: SFr. 72.79. — Springer Nature, Cham, 2018.

This 49th volume offers a good sample of the main streams of current research on probability and stochastic processes, in particular those active in France. This includes articles on latest developments on diffusion processes, large deviations, martingale theory, quasi-stationary distribution, random matrices, and many more. All the contributions come from spontaneous submissions and their diversity illustrates the good health of this branch of mathematics. The featured contributors are E. Boissard, F. Bouguet, J. Brossard, M. Capitaine, P. Cattiaux, N. Champagnat, K. Abdoulaye Coulibaly-Pasquier, H. Elad Altman, A. Guillin, P. Kratz, A. Lejay, C. Leuridan, P. McGill, L. Miclo, G. Pagès, E. Pardoux, P. Petit, B. Rajeev, L. Serlet, H. Tsukada, D. Villeomannais and B. Wilbertz.

Mécanique quantique

Thomas Creutzig, Andrew R. Linshaw, (Editors). — **Vertex algebras and geometry: AMS Special Session on Vertex Algebras and Geometry, October 8–9, 2016, Denver, Colorado, Mini-Conference on Vertex Algebras, October 10–11, 2016, Denver, Colorado**. — Contemporary mathematics, vol. 711. — Un vol. broché, 18×25, de VII, 168 p. — ISBN 978-1-4704-3717-6. — Prix: US$117.00. — American Mathematical Society, Providence, 2018.

This book contains the proceedings of the AMS Special Session on Vertex Algebras and Geometry, held from October 8–9, 2016, and the mini-conference on Vertex Algebras, held from October 10–11, 2016, in Denver, Colorado. The papers cover vertex algebras in connection with geometry and tensor categories, with topics in vertex rings, chiral algebroids, the Higgs branch conjecture, and applicability and use of vertex tensor categories.

Relativité

Jérémie Szeftel. — **Parametrix for wave equations on a rough background III : space-time regularity of the phase**. — Astérisque, vol. 401. — Un vol. broché, 17,5×24, de VIII, 321 p. — ISBN 978-2-85629-882-4. — Prix : €75.00. — Société Mathématique de France, Paris, 2018.

Cet ouvrage est dédié à la construction et au contrôle d'une paramétrix pour l'équation des ondes homogènes $\Box_g \phi = 0$, où g est une métrique peu régulière satisfaisant les équations d'Einstein dans le vide. Le contrôle d'une telle paramétrix et du terme d'erreur associé quand on suppose seulement des bornes L^2 sur le tenseur de courbure R de g est une étape cruciale de la preuve de la conjecture de courbure L^2 proposée en l'an 2000 et résolue en 2015 par S. Klainerman, I. Rodnianski et l'auteur. Plus généralement, cet ouvrage concerne le contrôle de l'équation eikonale sur un espace-temps peu régulier et la dérivation de bornes L^2 pour des opérateurs intégraux de Fourier sur des variétés avec une phase et un symbole peu réguliers, et possède de ce point vue un intérêt propre.

Biologie et sciences du comportement

Angiolo Farina, Andro Mikelic, Giuseppe Saccomandi, Adélia Sequeira, Eleuterio F. Toro; Angiolo Farina, Andro Mikelic, Fabio Rosso, (Editors). — **Non-Newtonian fluid mechanics and complex flow, Leivo Terme, Italy 2016**. — A CIME-CIRM course. — Lecture notes in mathematics, vol. 2212. CIME Foundation subseries. — Un vol. broché, 15,5×23,5, de IX, 299 p. — ISBN 978-3-319-74796-5. — Prix: €51.99. — Springer Nature, Cham, 2018.

This book presents a series of challenging mathematical problems which arise in the modeling of Non-Newtonian fluid dynamics. It focuses in particular on the mathematical and physical modeling of a variety of contemporary problems, and provides some results. The flow properties of Non-Newtonian fluids differ in many ways from those of Newtonian fluids. Many biological fluids (blood, for instance) exhibit a non-Newtonian behavior, as do many naturally occurring or technologically relevant fluids such as molten polymers, oil, mud, lava, salt solutions, paint, and so on. The term "complex flows" usually refers to those fluids presenting an "internal structure" (fluid mixtures, solutions, multiphase flows, and so on). Modern research on complex flows has increased considerably in recent years due to the many biological and industrial applications.

Avner Friedman. — **Mathematical biology: modeling and analysis**. — Conference board of the mathematical sciences CBMS. — CBMS Regional conference series in mathematics, vol. 127. — Un vol. broché, 18×25, de VIII, 100 p. — ISBN 978-1-4704-4715-1. — Prix: US$52.00. — American Mathematical Society, Providence, 2018.

A co-publication of the AMS and CBMS. The fast growing field of mathematical biology addresses biological questions using mathematical models from areas such as dynamical systems, probability, statistics, and discrete mathematics. This book considers models that are described by systems of partial differential equations, and it focuses on modeling, rather than on numerical methods and simulations. The models studied are concerned with population dynamics, cancer, risk of plaque growth associated with high cholesterol, and wound healing. A rich variety of open problems demonstrates the exciting challenges and opportunities for research at the interface of mathematics and biology. This book primarily addresses students and researchers in mathematics who do not necessarily have any background in biology and who may have had little exposure to PDEs.