

# Généralités

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## BULLETIN BIBLIOGRAPHIQUE

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### *Généralités*

Stephen ABBOTT. — **Understanding analysis.** — Undergraduate texts in mathematics. — Un vol. relié,  $16,5 \times 24$ , de XII, 257 p. — ISBN 0-387-95060-5. — Prix: €44.95. — Springer, New York, 2001.

*Understanding Analysis* outlines an elementary, one-semester course designed to expose students to the rich rewards inherent in taking a mathematically rigorous approach to the study of functions of a real variable. The aim of a course in real analysis should be to challenge and improve mathematical intuition rather than to verify it. The philosophy of this book is to focus attention on the questions that give analysis its inherent fascination. Does the Cantor set contain any irrational numbers? Can the set of points where a function is discontinuous be arbitrary? Are derivatives continuous? Are derivatives integrable?... In giving these topics center stage, the hard work of a rigorous study is justified by the fact that they are inaccessible without it.

Williams J. ADAMS, with illustrations by Ramuné B. ADAMS. — **Slippery math in public affairs: price tag and defense.** — Un vol. relié,  $16 \times 24$ , de XIII, 247 p. — ISBN 0-8247-0790-X. — Prix: US\$125.00. — Marcel Dekker, New York, 2002.

This pragmatic book examines flawed usage of math in public affairs through actual cases of how mathematical data and conclusions can be distorted and misrepresented to influence public opinion — highlighting how slippery numbers and questionable mathematical conclusions emerge and what can be done to safeguard against them. This book analyses the cost of “slippery math”... offers exemplary self-study programs to improve perspective on the use of math... depicts the development of math models and their use and misuse... and considers proper and improper polling methods.

A.K. AGARWAL, Bruce C. BERNDT, Christian F. KRATTENTHALER, Gary L. MULLEN, K. RAMACHANDRA, Michel WALDSCHMIDT, (Editors). — **Number theory and discrete mathematics.** — Trends in mathematics. — Un vol. relié,  $17 \times 24$ , de XVI, 314 p. — ISBN 3-7643-6720-2. — Prix: SFr. 142.00. — Birkhäuser, Basel, 2002.

The International Conference on Number Theory and Discrete Mathematics in honor of Srinivasa Ramanujan was held at the Centre for Advanced Study in Mathematics, Panjab University, Chandigarh, India, during October 2-6, 2000, as a contribution to the International Year of Mathematics. This volume contains the refereed proceedings of this conference and collects 29 articles written by some of the leading specialists worldwide. Most of the papers provide recent trends, problems and their current status as well as historical backgrounds of their subjects. Some contributions are related to Ramanujan's mathematics, which should stimulate the interest in his work.

Titu ANDREESCU, Zuming FENG, (Editors). — **Mathematical Olympiads 1999-2000: problems and solutions from around the world.** — Un vol. broché, 15 × 23, de xi, 323 p. — ISBN 0-883-85805-3. — Prix: £21.95. — Mathematical Association of America, distributed by Cambridge University Press, Cambridge, 2002.

This book contains solutions to challenging problems from algebra, geometry, combinatorics, and number theory featured in the earlier book *Mathematical Olympiads: Problems and Solutions from Around the World 1998-1999*, together with selected questions (without solutions) from 30 national and regional Olympiads given during 2000. This collection is intended as practice for serious students who wish to improve their performance. Different nations have different mathematical cultures, and readers will find some of these questions extremely difficult, and some rather easy. The authors have included a wide variety of problems, especially from those countries that have often done well at the International Mathematical Olympiad (IMO).

Dominique AZÉ, Guillaume CONSTANS, Jean-Baptiste HIRIART-URRUTY. — **Calcul différentiel et équations différentielles: exercices et problèmes corrigés.** — Sciences Sup. — Un vol. broché, 17 × 24, de xv, 220 p. — ISBN 2-10-006772-9. — Prix: €26.00. — Dunod, Paris, 2002.

Le présent ouvrage s'adresse principalement aux étudiants du module intitulé «Calcul différentiel – Équations différentielles» dispensé dans les formations de mathématiques au niveau de la licence de mathématiques. Il s'agit d'un recueil de 36 devoirs, au sens premier de ce vocable, c'est-à-dire de travaux à effectuer, en temps limité ou chez soi, seul ou à plusieurs. La durée estimée moyenne est de 3 heures pour chaque devoir, lequel comporte généralement deux ou trois exercices indépendants. Les thèmes traités suivent le déroulement standard du module avec, au fur et à mesure du déroulement, un retour sur les chapitres passés, bref une progression en spirale plutôt que linéaire.

V. BENCI, G. CERAMI, M. DEGIOVANNI, D. FORTUNATO, F. GIANNONI, A.M. MICHELETTI, (Editors). — **Variational and topological methods in the study of nonlinear phenomena.** — Progress in nonlinear differential equations and their applications, vol. 49. — Un vol. relié, 16 × 24, de 131 p. — ISBN 0-8176-4278-1. — Prix: SFr. 179.00. — Birkhäuser, Boston, 2002.

This volume covers recent advances in the field of nonlinear functional analysis and its applications to nonlinear partial and ordinary differential equations, with particular emphasis on variational and topological methods. A broad range of topics is covered, including: concentration phenomena in PDEs; variational methods with applications to PDEs and physics; periodic solutions of ODEs; computational aspects in topological methods; mathematical models in biology. Though well-differentiated, the topics covered are unified through a common perspective and approach. Unique to the work are several chapters on computational aspects and applications to biology, not usually found with such basic studies on PDEs and ODEs. The volume is an excellent reference text for researchers and graduate students in the above-mentioned fields.

Peter BOUWKNEGT, Siye WU, (Editors). — **Geometric analysis and applications to quantum field theory.** — Progress in mathematics, vol. 205. — Un vol. relié, 16 × 24, de ix, 203 p. — ISBN 0-8176-4287-0. — Prix: SFr. 98.00. — Birkhäuser, Basel, 2002.

The various chapters in this volume, treating the interface of geometric analysis and mathematical physics, represent current research interests. *Key topics include:* A self-contained derivation of the partition function of Chern-Simons gauge theory in the semiclassical approximation

(D.H.Adams) — Algebraic and geometric aspects of the Knizhnik-Zamoldchikov equations in conformal field theory (P. Bouwknegt) — Application of the representation theory of loop groups to simple models in quantum field theory and to certain integrable systems (A.L. Carey and E. Langmann) — A study of variational methods in Hermitian geometry from the viewpoint of the critical points of action functionals together with physical backgrounds (A. Harris) — A review of monopoles in nonabelian gauge theories (M.K. Murray) — Exciting developments in quantum cohomology (Y. Ruan) — The physics origin of Seiberg-Witten equations in 4-manifold theory (S.Wu).

Claude P. BRUTER, (Editor). — **Mathematics and art: mathematical visualization in art and education.** — Mathematics and visualization. — Un vol. relié, 16×24, de x, 337 p. — ISBN 3-540-43422-4. — Prix: € 64.95. — Springer, New York, 2002.

Recent progress in research, teaching and communication has arisen from the use of new tools in visualization. To be fruitful, visualization needs precision and beauty. This book is a source of mathematical illustrations by mathematicians as well as artists. It offers examples in many basic mathematical fields including polyhedra theory, group theory, solving polynomial equations, dynamical systems and differential topology. For a long time, arts, architecture, music and painting have been the source of new developments in mathematics. And vice versa, artists have often found new techniques, themes and inspiration within mathematics. Here, while mathematicians provide mathematical tools for the analysis of musical creations, the contributions from sculptors emphasize the role of mathematics in their work.

Bernard DACOROGNA, Chiara TANTERI. — **Analyse avancée pour ingénieurs.** — Enseignement des mathématiques. — Un vol. broché, 16×24, de x, 335 p. — ISBN 2-88074-513-6. — Prix: SFr. 62.00. — Presses polytechniques et universitaires romandes, Lausanne, 2002.

La matière traitée dans cet ouvrage comprend l'analyse vectorielle (théorèmes de Green, de la divergence, de Stokes), l'analyse complexe (fonctions holomorphes, équations de Cauchy-Riemann, séries de Laurent, théorème des résidus, applications conformes) ainsi que l'analyse de Fourier (séries de Fourier, transformée de Fourier, transformée de Laplace, applications aux équations différentielles). Les définitions et les théorèmes principaux sont présentés sous forme d'aide-mémoire, ils sont donc énoncés avec clarté et précision mais sans commentaires. Des exemples significatifs sont ensuite discutés en détail. Enfin de nombreux exercices sont proposés et ils sont intégralement corrigés.

Leo DORTS, Chris DORAN, Joan LASENBY, (Editors). — **Applications of geometric algebra in computer science and engineering.** — Un vol. broché, 16×24, de xxiv, 478 p. — ISBN 0-8176-4267-6. — Prix: SFr. 189.00. — Birkhäuser, Boston, 2002.

The articles in this volume, written by experts in various fields, reflect an interdisciplinary approach to the subject, and highlight a range of techniques and applications. Relevant ideas are introduced in a self-contained manner and only a knowledge of linear algebra and calculus is assumed. — *Features and topics:* the mathematical foundations of geometric algebra are explored; applications in computational geometry include models of reflection and ray-tracing and a new and concise characterization of the crystallographic groups; applications in engineering include robotics, image geometry, control-pose estimation, inverse kinematics and dynamics, control and visual navigation; applications in physics include rigid-body dynamics, elasticity, and electromagnetism; chapters dedicated to quantum information theory dealing with multi-particle entanglement, MRI, and relativistic generalizations.

Gail E. FITZSIMONS. — **What counts as mathematics?: technologies of power in adult and vocational education.** — Mathematics education library, vol. 28. — Un vol. relié, 16×24,5, de 213 p. — ISBN 1-4020-0668-3. — Prix: €90.00. — Kluwer, Dordrecht, 2002.

This book is suitable for mathematics and vocational educators, researchers, and research students. Historical, sociological, and practical elements of mathematics within vocational education are set against the emerging impact technology. Differences between the institution and the workplace are raised as sources of tension as well as offering new possibilities for vocational mathematics education, while recognizing that notions of competence and indeed knowledge itself are non-neutral. This is especially important where a commodified view of education poses a key challenge and on-the-job learning is privileged over traditional conceptions of curriculum and pedagogy. The author draws on an extensive literature base, as well as two decades of practical teaching experience, to critique the impact of neoliberal policies upon mathematics education in a sector where adult and vocational students arguably need the highest quality educational experiences in order to benefit national economies and to enable their democratic participation in a globalized world.

Lawrence GOLDMAN. — **Science, reform, and politics in Victorian Britain: the Social Science Association 1857-1886.** — Un vol. relié, 16×23,5, de xv, 430 p. — ISBN 0-521-33053-X. — Prix: £50.00. — Cambridge University Press, Cambridge, 2002.

This book is a study of the relationship between social thought, social policy and politics in Victorian Britain. The author focuses on a remarkable organization, the National Association for the Promotion of Social Science, known as the Social Science Association. For three decades this served as a forum for the discussion of key Victorian social questions and as an influential adviser to governments, and its history discloses how social policy was made in these years.

Gábor HALÁSZ, László LOVÁSZ, Miklós SIMONOVOTIS, Vera T. SÓS, (Editors). — **Paul Erdős and his mathematics.** — Bolyai Society mathematical studies, vol. 11. — Deux volumes reliés, 17×24, de respectivement, 728 p. (vol. 1), 695 p. (vol. 2). — ISBN 3-540-42236-6. — Prix: SFr. 322.00. — Springer, Berlin, 2002.

Since his death in 1996, many scientific meetings have been dedicated to the memory of Paul Erdős. From July 4 to 11, 1999, the Conference *Paul Erdős and his Mathematics* was held in Budapest, with the ambitious goal of showing the whole range of Paul Erdős' work – a difficult task in view of Paul Erdős' versatility and his broad scope of interest in mathematics. According to this goal, the topics of lectures, given by the leading specialists on the subjects, included number theory, combinatorics, analysis, set theory, probability, geometry and areas connecting them like ergodic theory. Our aim with the publication of these two volumes is the same as with the conference itself. These volumes provide a fascinating and impressive picture of Erdős' monumental oeuvre. A glimpse of Paul Erdős the person is given by reminiscences by his old friends about different periods of his life.

Hans LEWY. — **Selecta.** — Edited by David Kinderlehrer. — 2 vol., de respectivement, xxiii, 357 p. et xviii, 446 p. Prix: SFr. 225.00, chaque volume. — ISBN 0-8176-3524-6 (vol. 1), 0-8176-3523-8 (vol. 2). — Birkhäuser, Boston, 2002.

The work of Hans Lewy (1904-1988) has had a profound influence in the direction of applied mathematics and partial differential equations, in particular, from the late 1920s. We are all familiar with two of the particulars. The Courant-Friedrichs-Lewy condition (1928), or CFL condition, was devised to obtain existence and approximation results... His example of a linear equation with no solution (1957), with its attendant consequence that most equations have no

solutions, was not merely an unexpected fact, but changed the viewpoint of the entire field. Lewy made pivotal contributions in many other areas, for example, the regularity theory of elliptic equations and systems, the Monge-Ampère equation, the Minkowski problem, the asymptotic analysis of boundary value problems, and several complex variables. He was among the first to study variational inequalities. In this two volume work, almost all of Lewy's papers are presented, in chronological order (vol. 1: 1925-1951, vol. 2: 1952-1989). They are preceded by several short essays about Lewy himself, prepared by Helen Lewy, Constance Reid, and David Kinderlehrer, and commentaries on his work by Erhard Heinz, Peter Lax, Jean Leray, Richard MacCamy, François Trèves, and Louis Nirenberg. Additionally, there are Lewy's own remarks on the occasion of his honorary degree from the University of Bonn.

David MUMFORD, Caroline SERIES, David WRIGHT. — **Indra's pearls: the vision of Felix Klein.** — Un vol. relié, 19,5 × 24,5, de XIX, 395 p. — ISBN 0-521-35253-3. — Prix: £29.95. — Cambridge University Press, Cambridge, 2002.

Felix Klein discovered in mathematics an idea prefigured in Buddhist mythology: the heaven of Indra contained a net of pearls, each of which was reflected in its neighbor, so that the whole universe was mirrored in each pearl. Klein studied infinitely repeated reflections and was led to forms with multiple co-existing symmetries, each simple in itself, but whose interactions produce fractals on the edge of chaos. For a century these images barely existed outside the imagination of mathematicians. However in the 1980s the authors embarked on the first computer exploration of Klein's vision, and in so doing found further extraordinary images of their own. Join the authors on the path from some basic mathematical ideas to the simple algorithms that create the delicate fractal filigrees, most of which have never appeared in print before. Beginners can learn to understand what the images mean and follow the step-by-step instructions for writing computer programs that generate them.

Clifford A. PICKOVER. — **The mathematics of Oz: mental gymnastics from beyond the edge.** — Un vol. relié, 16 × 23,5, de XVI, 351 p. — ISBN 0-521-01678-9. — Prix: £21.95. — Cambridge University Press, Cambridge, 2002.

Prepare yourself for a shattering odyssey as *The Mathematics of Oz* unlocks the doors of your imagination. The tests devised by enigmatic Dr. Oz to assess human intelligence will tease the brain of even the most avid puzzle fan. Test your wits on a host of mathematical topics: geometry and mazes, sequences, series, sets, arrangements, probability and misdirection, number theory, arithmetic, and even several problems dealing with the physical world. With numerous illustrations, this is an original, fun-filled, and thoroughly unique introduction to numbers and their role in creativity, computers, games, practical research, and absurd adventures that teeter on the edge of logic and insanity. *The Mathematics of Oz* will have you squirming in frustration and begging for more.

Henri-POINCARÉ. — **Scientific opportunism. L'opportunisme scientifique: an anthology.** — Compiled by Louis Rougier. — Edited by Laurent Rollet. — Publications des Archives Henri-Poincaré. — Un vol. relié, 24 × 17, de XXVI, 208 p. — ISBN 3-7643-6539-0. — Prix: SFr. 88.00. — Birkhäuser, Basel, 2002.

Au cours de sa vie, Poincaré publia trois ouvrages philosophiques majeurs qui connurent un grand succès: *La science et l'hypothèse* (1902), *La valeur de la science* (1905) et *Science et méthode* (1908). Après sa mort, un quatrième volume de ses œuvres philosophiques fut publié par ses héritiers sous le titre de *Dernières pensées* (1913). Autour de 1919, Gustave Le Bon écrivait une lettre à la veuve de Poincaré. En tant que directeur de la *Bibliothèque de Philosophie*

*Scientifique* il lui demandait l'autorisation de publier un nouveau volume posthume. Louis Rougier avait élaboré le projet en collaboration avec Gustave Le Bon... *L'Opportunisme scientifique* devait être le cinquième et dernier volume des œuvres philosophiques de Poincaré. En raison des réserves émises par les héritiers du mathématicien ce livre ne fut jamais publié. Le but du présent ouvrage est de restaurer le projet de Rougier tout en apportant un éclairage sur son histoire et sur la postérité de la pensée philosophique de Poincaré.

## **Histoire**

Jean BAUDET. — **Nouvel abrégé d'histoire de mathématiques.** — Un vol. broché, 17 × 24, de iv, 332 p. — ISBN 2-7117-5316-6. — Prix : € 30.00. — Paris, Vuibert, 2002.

Les mathématiques forment un tout que l'on peut décrire et expliquer sans s'appuyer sur d'autres connaissances. C'est assurément ce qui explique la fascination qu'elles exercent sur certains esprits tandis qu'elles rebutent les autres. Les mathématiques ont préoccupé des créateurs aussi différents qu'Euclide, Omar Khayyam, Descartes et Pascal ; elles ont permis à Einstein de bouleverser notre vision du monde. Plus récemment encore, elles ont rendu possible le développement de l'informatique et des télécommunications. Résumant vingt-six siècles de recherches sur les figures et sur les nombres, cette initiation aux mathématiques ne réclame aucune connaissance préalable. Les notions techniques sont présentées ici en respectant l'ordre dans lequel l'humanité les a rencontrées.

Herbert BECKERT. — **Zur Erkenntnis des Unendlichen.** — Abhandlungen der Sächsischen Akademie der Wissenschaften zu Leipzig. Mathematisch-naturwissenschaftliche Klasse, Band 59, Heft 3. — Un vol. broché, 21 × 29,5, de 147 p. — ISBN 3-7776-1136-0. — Prix : € 59.00. — Verlag der Sächsischen Akademie der Wissenschaften zu Leipzig, in Kommission bei S. Hirzel, Stuttgart, 2001.

Das potentielle und Aktualunendliche. — Zur Philosophie des Unendlichen. — Über die Zahl und das Zählen. — Die Entwicklungszüge der Mathematik bis zur Zeit der Renaissance. — Der Weltraum. — Die Zeit. — Die Null und das Nichts. — Zahlenfolgen und der Limesbegriff. — Die Erfindung der Infinitesimalrechnung. — Die Konstruktion der reellen Zahlen über Dezimalbrüche. — Zur Mengenlehre von G. Cantor. — Stetigkeit und Kontinuum. — Die Erfindung der Elementargeometrie. — Zur Theorie der Wahrscheinlichkeit. — Die Methode der idealen Elemente in der Mathematik. — Mathematik und Erfahrung. — Über die Erkenntnis des Unendlichen. — Unendlichkeit und belebte Natur.

John STACHEL. — **Einstein from "B" to "Z".** — Einstein studies, vol. 9. — Un vol. relié, 24 × 16, de xi, 556 p. — ISBN 0-8176-4143-2. — Prix : SFr. 158.00. — Birkhäuser, Boston, 2002.

The author of this collection of 37 published and unpublished articles on Albert Einstein, has written about Einstein and his work for over 40 years. Trained as a theoretical physicist specializing in the theory of relativity, he was chosen as the founding editor of *The Collected Papers of Albert Einstein* 25 years ago, and is currently Director of the Boston University Center for Einstein Studies. Based on a detailed study of documentary evidence, much of which was newly discovered in the course of his work, John Stachel debunks many of the old (and some new) myths about Einstein and offers novel insight into his life and work. Throughout the volume, a new, more human picture of Einstein is offered to replace the plaster saint of popular legend. In particular, a youthful Einstein emerges from the obscurity that previously shrouded his early years, and much new light is shed on the origins of the special and general theories of relativity. Also discussed in some detail are Einstein's troubled relationship with his first wife, his friendships with other physicists such as Eddington, Bose and Pauli, and his Jewish identity.