

# Généralités

Objektyp: **Chapter**

Zeitschrift: **L'Enseignement Mathématique**

Band (Jahr): **49 (2003)**

Heft 3-4: **L'ENSEIGNEMENT MATHÉMATIQUE**

PDF erstellt am: **21.07.2024**

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## BULLETIN BIBLIOGRAPHIQUE

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### *Généralités*

Stéphane BALAC, Frédéric STURM. — **Algèbre et analyse: cours de mathématiques de première année avec exercices corrigés.** — Collection des sciences appliquées de l'INSA de Lyon. — Un vol. broché, 16×24, de xxii, 1021 p. — ISBN 2-88074-558-6. — Prix: SFr. 74.25. — Presses polytechniques et universitaires romandes, Lausanne, 2003.

Cet ouvrage, réunissant en un tout cohérent algèbre et analyse, s'adresse de manière plus spécifique aux élèves de première année des cycles préparatoires intégrés des écoles d'ingénieurs mais peut être utilisé avec profit par les autres étudiants de premier cycle universitaire. Ce livre ne constitue pas seulement une somme de connaissances mathématiques de 1<sup>ère</sup> année de l'enseignement supérieur mais vise à présenter de manière précise les résultats essentiels à une formation d'ingénieur généraliste. L'ouvrage est divisé en 20 chapitres regroupés en 5 grandes parties: ensembles numériques fondamentaux, polynômes et fractions rationnelles, algèbre linéaire, calcul différentiel et calcul intégral. Chaque chapitre contient de courts exercices visant à tester la bonne compréhension des notions introduites et se termine par quelques exercices de synthèse. Une correction détaillée et commentée de tous les exercices est fournie en fin de chapitre. Quelques éléments biographiques de mathématiciens cités dans l'ouvrage y figurent également afin de mieux situer les résultats présentés dans leur contexte historique.

Heinz BAUER. — **Selecta.** — Edited by Herbert HEYER, Niels JACOB, Ivan NETUKA. — Un vol. relié, 18×24, de xiv, 597 p. — ISBN 3-11-017350-6. — Prix: € 128.00. — Walter de Gruyter, Berlin, 2003.

Selecta from the work of a highly acknowledged mathematician can be effective reading with respect to various points of view. They can serve as an overview of the interactions between the fields the author has worked in. Occasionally they contain contributions that are difficult to find in libraries. The editors have collected Bauer's most important contributions, classified them within the three topics "Measure and integration", "Convexity" and "Potential theory" and had the three subcollections provided by instructive essays on the work achieved and its implications. Together with the curriculum and bibliography the resulting volume is designed to offer to the appreciative reader Bauer's main innovative ideas in a convenient presentation.

Edward BRITTON, Lynn PAINE, David PIMM, Senta RAIZEN, (Editors). — **Comprehensive teacher induction: systems for early career learning.** — Un vol. relié, 17×24,5, de xiv, 404 p. — ISBN 1-4020-1147-4. — Prix: € 151.00. — Kluwer, Dordrecht, 2003.

What does it take to meet the wide-ranging needs of beginning teachers? Based on a three-year study, the authors describe how comprehensive teacher induction systems can not only provide teacher support but also promote learning more about how to teach. For the past 10 to

25 years, induction programs in Shanghai, France, Japan, New Zealand and Switzerland have provided well-funded induction support that reaches all beginning teachers. With National Science Foundation funding and under the auspices of WestEd's National Center for Improving Science Education and Michigan State University, researchers conducted in-depth case studies of induction programs. They particularly focused on novice mathematics and science teachers. This resulting book calls for re-thinking what teacher induction is about, whom it should serve, what the "curriculum" of induction should be and the policies, programs, and practices needed to deliver it.

Yves CAUMEL. — **Cours d'analyse fonctionnelle et complexe: pour les élèves ingénieurs et les étudiants des filières mathématiques de l'Université.** — Un vol. broché, 17×24, de 238 p. — ISBN 2-85428-563-8. — Prix: €24.00. — Cépadues Editions, Toulouse, 2003.

Le cours d'analyse d'une école d'ingénieurs est le socle conceptuel sur lequel reposent les autres enseignements mathématiques, constituant ensemble le cadre de modélisation des autres enseignements scientifiques. La rédaction de ce cours, tant dans son contenu que dans sa structure, est inspirée par le profil et les besoins en mathématiques de l'élève et du futur ingénieur. L'auteur a donc choisi d'exposer un cours d'analyse allégé des concepts et des résultats à faible plus-value théorique ou pratique. Adeptes d'une pédagogie constructive et motivante, évitant autant que faire se peut l'inefficace linéarité de l'exposé déductif, l'auteur a semé le parcours du néophyte d'appels à l'intuition géométrique et d'applications aux sciences physiques, d'intermèdes historiques ou épistémologiques ainsi que de nombreux exercices et problèmes corrigés. Cet ouvrage n'est donc pas un traité, mais un livre compagnon qui convient à l'apprentissage de l'analyse par les étudiants de Licence et de Maîtrise des filières mathématiques et physiques.

Graeme COHEN. — **A course in modern analysis and its applications.** — Australian Mathematical Society lecture series, vol. 17. — Un vol. broché, 15×22,5, de XIII, 333 p. — ISBN 0-521-52627-2 (relié: 0-521-81996-2). — Prix: £24.95 (relié: £60.00). — Cambridge University Press, Cambridge, 2003.

Designed as a textbook for a one-semester course at a senior undergraduate level, this book will appeal not only to mathematics undergraduates, but also to those who need to learn some mathematical analysis for use in other areas such as engineering, physics, biology or finance. Topics such as completeness and compactness are approached initially through convergence of sequences in metric space, and emphasis remains on this approach. However, the alternative topological approach is described in a separate chapter. This gives the book more flexibility, making it especially useful as an introduction to more advanced areas such as functional analysis. Nominal divisions of pure and applied mathematics have been merged, leaving enough for students of either inclination to have a feeling for what further developments might look like. Applications have been included such as differential and integral equations, systems of linear algebraic equations, approximation theory, numerical analysis and quantum mechanics.

Ulrich DAEPF, Pamela GORKIN. — **Reading, writing, and proving: a closer look at mathematics.** — Undergraduate texts in mathematics. — Un vol. relié, 16×24, de XVI, 395 p. — ISBN 0-387-00834-9. — Prix: €64.95. — Springer, New York, 2003.

This book, which is based on Pólya's method of problem solving, aids students in their transition from calculus (or precalculus) to higher-level mathematics. The book begins by providing a great deal of guidance on how to approach definitions, examples, and theorems in mathematics. It ends by providing projects for independent study. Students will follow Pólya's four-step process: learn to understand the problem; devise a plan to solve the problem; carry out that plan; and look back and check what the results told them. Special emphasis is placed

on reading carefully and writing well. The authors have included a wide variety of examples, exercises with solutions, problems, and over 40 illustrations, chosen to emphasize these goals. Historical connections are made throughout the text, and students are encouraged to use the rather extensive bibliography to begin making connections of their own. While standard texts in this area prepare students for future courses in algebra, this book also includes chapters on sequences, convergence, and metric spaces for those wanting to bridge the gap between the standard course in calculus and one in analysis.

Jacques DOUCHET. — **Analyse: recueil d'exercices et aide-mémoire, vol. 1.** — Enseignement des mathématiques. — Un vol. broché, 16×24, de ix, 408 p. — ISBN 2-88074-552-7. — Prix: SFr. 48.00. — Presses polytechniques et universitaires romandes, Lausanne, 2003.

Ce recueil de 1277 exercices est principalement destiné aux étudiants du premier cycle universitaire qui suivent un cours sur le calcul différentiel et intégral concernant les fonctions réelles d'une variable réelle. L'ouvrage contient 9 chapitres divisés chacun en 2 parties. La première est un rappel de tous les principaux résultats et définitions qu'il faut connaître sur la matière traitée. Les propositions sont énoncées avec précision mais sans démonstration. La deuxième partie est constituée d'un recueil d'exercices en rapport avec chacun des chapitres, accompagnés de leurs solutions.

Michele EMMER, Mirella MANARESI, (Editors). — **Mathematics, art, technology and cinema.** — Un vol. relié, 16×24, de xi, 242 p. — ISBN 3-540-00601-X. — Prix: € 79.95. — Springer, Berlin, 2003.

This book is about mathematics. But also about art, technology and images. And above all, about cinema. The book was conceived as a contribution to the World Mathematical Year 2000. The editors argue that the discussion about the differences between the so called two cultures of science and humanism is a thing of the past. They hold that both cultures are truly linked through ideas and creativity, not only through technology. In doing so, they succeed in reaching out to non-mathematicians, and those who are not particularly fond of mathematics. An insightful book for mathematicians, film lovers, those who feel passionate about images, and those with a questioning mind.

Leonhard EULER. — **Lettres à une princesse d'Allemagne sur divers sujets de physique et de philosophie.** — Un vol. broché, 15×22,5, de xxix, 512 p. — ISBN 2-88074-524-1. — Prix: SFr. 48.00. — Presses polytechniques et universitaires romandes, Lausanne, 2003.

Ces lettres rédigées à Berlin entre 1760 et 1762 et publiées à Saint-Pétersbourg de 1768 à 1772 constituent un brillant exemple de vulgarisation scientifique destiné à un lectorat non spécialisé. Ecrites par le grand mathématicien bâlois Euler (1707-1783), elles ont immédiatement rencontré un véritable succès populaire dès leur première publication. Rédigées dans un français limpide, elles ont été traduites dans de nombreuses langues. Euler aborde ici tous les sujets en dehors des mathématiques proprement dites, comme l'astronomie, la mécanique, l'optique, la musique, la philosophie et la logique, domaine auquel il a personnellement contribué de manière significative.

Roger GODEMENT. — **Analyse mathématique II: calcul différentiel et integral, series de Fourier, fonctions holomorphes.** — 2<sup>ème</sup> édition corrigée. — Un vol. broché, 16,5×24, de viii, 490 p. — ISBN 3-540-00655-9. — Prix: € 42.61. — Springer, Berlin, 2003.

Les deux premiers volumes sont consacrés aux fonctions dans  $\mathbf{R}$  ou  $\mathbf{C}$ , y compris la théorie élémentaire des séries et intégrales de Fourier et une partie de celle des fonctions holomorphes.

L'exposé, non strictement linéaire, combine indications historiques et raisonnement rigoureux. Il montre la diversité des voies d'accès aux principaux résultats afin de familiariser le lecteur avec les méthodes de raisonnement et idées fondamentales plutôt qu'avec les techniques de calcul, point de vue utile aussi aux personnes travaillant seules.

Roger GODEMENT. — **Analyse mathématique IV: intégration et théorie spectrale, analyse harmonique, le jardin des délices modulaires.** — Un vol. broché,  $16,5 \times 24$ , de XII, 509 p. — ISBN 3-540-438410. — Prix: €44.95. — Springer, Berlin, 2003.

Ce 4<sup>ème</sup> volume de l'ouvrage *Analyse mathématique* initiera le lecteur à l'analyse fonctionnelle (intégration, espaces de Hilbert, analyse harmonique en théorie des groupes) et aux méthodes de la théorie des fonctions modulaires (série  $L$  et theta, fonctions elliptiques, usage de l'algèbre de Lie de  $SL(2, \mathbf{R})$ ). Tout comme pour les volumes 1 à 3, on reconnaîtra ici encore le style inimitable de l'auteur et pas seulement par son refus de l'écriture condensée en usage dans de nombreux manuels. Mariant judicieusement les mathématiques dites «modernes» et «classiques», la première partie (Intégration) est d'utilité universelle tandis que la seconde oriente le lecteur vers un domaine de recherche spécialisé et très actif, avec de vastes généralisations possibles.

Ross HONSBERGER. — **Mathematical diamonds.** — Dolciani mathematical expositions, no. 26. — Un vol. broché,  $15 \times 23$ , de x, 245 p. — ISBN 0-88385-332-9. — Prix: £21.95. — The Mathematical Association of America, Washington, D.C., distributed by Cambridge University Press, Cambridge, 2003.

Ross Honsberger has done it again! He has brought together another wonderful collection of elementary mathematical problems and their solutions that reflect the beauty of mathematics. The problems abound in striking surprises and brilliant ideas. Many come from mathematical journals. Others come from various mathematical competitions such as the *Tournament of the Towns*, the *Balkan Olympiads*, the *American Invitational Mathematics Exam*, and the *Putnam Mathematical Competition*. And two chapters are based on work by Paul Erdős. The mathematical requirements rarely go beyond the knowledge of a college freshman, but the ingenuity of the solutions is what makes *Mathematical Diamonds* so brilliant.

V. LAKSHMIBAI, V. BALAJI, V.B. MEHTA, K.R. NAGARAJAN, K. PARANJAPE, P. SANKARAN, R. SRIDHARAN, (Editors). — **A tribute to C.S. Seshadri: a collection of articles on geometry and representation theory.** — Trends in mathematics. — Un vol. relié,  $17,5 \times 24$ , de XIX, 541 p. — ISBN 3-7643-0444-8. — Prix: SFr. 198.00. — Birkhäuser, Basel, 2003.

C.S. Seshadri turned seventy on the "29<sup>th</sup> of February", 2002. Some of his friends and students came together on March 1, 2002 to felicitate Seshadri. To mark this occasion, a symposium was held in Chennai, India, where some of his colleagues gave expository talks highlighting Seshadri's contributions to mathematics. This volume contains expanded texts of these talks as well as research and expository papers on geometry and representation theory. It will serve as an excellent reference to researchers and students in these areas.

Niels LAURITZEN. — **Concrete abstract algebra: from numbers to Gröbner bases.** — Un vol. broché,  $15 \times 23$ , de XIV, 240 p. — ISBN 0-521-53410-0 (relié: 0-521-82679-9). — Prix: £19.95 (relié: £55.00). — Cambridge University Press, Cambridge, 2003.

This book develops the theory of abstract algebra from numbers to Gröbner bases, whilst taking in all the usual material of a traditional introductory course. In addition, there is a rich supply of topics such as cryptography, factoring algorithms for integers, quadratic residues,

finite fields, factoring algorithms for polynomials, and systems of non-linear equations. A special feature is that Gröbner bases do not appear as an isolated example. They are fully integrated as a subject that can be successfully taught in an undergraduate context. Lauritzen's approach to teaching abstract algebra is based on an extensive use of examples, applications, and exercises. The basic philosophy is that inspiring, non-trivial applications and examples give motivation and ease the learning of abstract concepts.

Les POOK. — **Flexagons inside out.** — Un vol. broché,  $17,5 \times 25$ , de xi, 170 p. — ISBN 0-521-52574-8 (relié: 0-521-81970-9). — Prix: £19.95 (relié: £55.00). — Cambridge University Press, Cambridge, 2003.

Flexagons are hinged polygons that have the intriguing property of displaying different pairs of faces when they are flexed. Workable paper models of flexagons are easy to make and entertaining to manipulate. Flexagons have a surprisingly complex mathematical structure and just how a flexagon works is not obvious on casual examination of a paper model. Flexagons may be appreciated at three different levels: firstly as toys or puzzles, secondly as a recreational mathematics topic and finally as the subject of serious mathematical study. This book is written for anyone interested in puzzles or recreational maths. No previous knowledge of flexagons is assumed, and the only prerequisite is some knowledge of elementary geometry. An attractive feature of the book is a collection of nets, with assembly instructions, for a wide range of paper models of flexagons. These are printed full size and laid out so they can be photocopied.

Judith D. SALLY, Paul J. SALLY, Jr. — **Trimathlon: a workout beyond the school curriculum.** — Un vol. broché,  $20,5 \times 25$ , de xiv, 250 p. — ISBN 1-56881-184-5. — Prix: US\$30.00. — A. K. Peters, Natick, Massachusetts, 2003.

In this book you will find games, problems and investigations to flex your math muscles and give you a new perspective on mathematics. The guided activities are fun, interesting and challenging – you will be introduced to some truly heavy-weight mathematical ideas. The strenuous mental activity often required has as its reward the satisfaction and confidence that accompany meaningful investigations of mathematical ideas. All information needed to solve the problems (as well as hints and suggestions) is provided.

Goro SHIMURA. — **Collected papers.** — 4 vol. reliés,  $17 \times 25,5$ , de respectivement, 795, 831, 924, 754 p. — ISBN 0-387-95406-6 (vol. 1), 0-387-95417-1 (vol. 2), 0-387-95418-X (vol. 3), 0-387-95416-3 (vol. 4). — Prix: €169.00 (vol. 1,2,4) €179.00 (vol. 3). — Springer, New York, 2002-2003.

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Qi-Xiao YE, W. BLUM, S. K. HOUSTON, Qi-Yuan JIANG. — **Mathematical modelling in education and culture: ICTMA 10**. — Un vol. relié, 16×24, de XII, 330 p. — ISBN 1-904275-05-2. — Prix: £40.00. — Horwood Publishing, Chichester, 2003.

The “mathematical modelling” movement in mathematics education both at school and university level has now been influencing curricula for about 20 years. Mathematics lecturers will find here useful material to enhance their teaching and extracurricular activities and educators will find innovative ideas to inform their course design and to focus their research, while students will find interesting problems to explore. The book contains contributions by international lecturers, researchers and educators recording the latest thinking and research, and demonstrates how the movement is influencing the culture of mathematics teaching in China.

## *Histoire*

H.-W. ALTEN, A. DJAFARI NAINI, M. FOLKERTS, H. SCHLOSSER, K.-H. SCHLOTE, H. WUSSING. — **4000 Jahre Algebra: Geschichte, Kulturen, Menschen**. — Von Zählstein zum Computer. — Un vol. relié, 16×24, de XIV, 653 p. — ISBN 3-540-43554-9. — Prix: €39.95. — Springer, Berlin, 2003.

Der Name Algebra entstand aus dem Buchtitel des persischen Gelehrten al-Chorezmi, dessen Namen als Algorithmus den Rechengang in modernen Computern beschreibt. So spannt sich der Bogen von den Anfängen der Algebra vor 4000 Jahren über ihre Entwicklung durch islamische Gelehrte des Mittelalters, Rechenmeister der Renaissance und Forscher der Neuzeit bis hin zur abstrakten Theorie algebraischer Strukturen und der Computeralgebra. Zeit- und kulturgeschichtliche Tabellen führen in die jeweilige Epoche ein, die Zusammenstellung der wesentlichen Inhalte und Aufgaben schliessen jedes Kapitel ab. Kulturhistorische und biographische Details sowie viele Abbildungen durchziehen und begleiten den Text.