

# **Théorie des groupes et généralisations**

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categories of  $K$ -theory. This leads to study of tensor products and the Morita theory. The categorical approach to localizations and completions of modules is formulated in terms of direct and inverse limits, prompting a discussion of localization of categories in general. Finally, local-global techniques which supply information about modules from their localizations and completions and underlie some interesting applications of  $K$ -theory to number theory and geometry are considered.

A.J. BERRICK and M.E. KEATING. — **An introduction to rings and modules with  $K$ -theory in view.** — Cambridge studies in advanced mathematics, vol. 65. — Un vol. relié, 15×23, de xv, 265 p. — ISBN 0-521-632749. — Prix: £35.00. — Cambridge University Press, Cambridge, 2000.

Starting from definitions, the book introduces fundamental constructions of rings and modules, as direct sums or products, and by exact sequences. It then explores the structure of modules over various types of ring: noncommutative polynomial rings, Artinian rings (both semisimple and not), and Dedekind domains. It also shows how Dedekind domains arise in number theory, and explicitly calculates some rings of integers and their class groups. About 200 exercises complement the text and introduce further topics. This book provides the background material for the authors' companion volume *Categories and Modules*, soon to appear.

## ***Théorie des groupes et généralisations***

David M. ARNOLD. — **Abelian groups and representations of finite partially ordered sets.** — CMS books in mathematics, vol. 2. — Un vol. relié, 16×24, de xii, 244 p. — ISBN 0-387-98982-X. — Prix: DM 159.00. — Springer, New York, 2000.

A recurring theme in a traditional introductory graduate algebra course is the existence and consequences of relationships between different algebraic structures. This is also the theme of this book, an exposition of connections between representations of finite partially ordered sets and Abelian groups. Emphasis is placed throughout on classification, a description of the objects up to isomorphism, and computation of representation type, a measure of when classification is feasible.

M. ASCHBACHER. — **Finite group theory.** — Second edition. — Cambridge studies in advanced mathematics, vol. 10. — Un vol. broché, 15×23, de xi, 304 p. — ISBN 0-521-78675-4. — Prix: £19.95. — Cambridge University Press, Cambridge, 2000.

This book develops the foundations of the theory of finite groups. It can serve as a text for a course on finite groups for students already exposed to a first course in algebra. For the reader with some mathematical sophistication but limited knowledge of finite group theory, the book supplies the basic background necessary to begin to read journal articles in the field. It also provides the specialist in finite group theory with a reference in the foundations of the subject. The second edition has been considerably improved, with a completely rewritten chapter considering the 2-signalizer functor theorem and the addition of an appendix containing solutions to exercises.

Michael ATKINSON, Nick GILBERT, James HOWIE, Steve LINTON, Edmund ROBERTSON, (Editors). — **Computational and geometric aspects of modern algebra.** — London Mathematical Society lecture note series, vol. 275. — Un vol. broché, 15×23, de viii, 279 p. — ISBN 0-521-78889-7. — Prix: £27.95. — Cambridge University Press, Cambridge, 2000.

This book comprises a collection of papers from participants at the ICMS workshop on Computational and Geometric Aspects of Modern Algebra, held at Heriot-Watt University in

1998. Written by leading researchers, the papers cover a wide range of topics in the vibrant areas of word problems in algebra and geometric group theory. This book represents a timely record of recent work and provides an indication of the key areas of future development.

Young Gheel BAIK, David L. JOHNSON, Ann Chi KIM, (Editors). — **Groups - Korea '98.** — Proceedings of the International Conference, held at Pusan National University, Pusan, Korea, August 10-16, 1998. — Un vol. relié,  $17,5 \times 25$ , de VIII, 382 p. — ISBN 3-11-016588-0. — Prix: DM 298.00. — Walter de Gruyter, Berlin, 2000.

This volume contains the Proceedings of the Fourth International Conference on the Theory of Groups, held at Pusan National University, Pusan, Korea, from August 10-16, 1998. The contributions to this volume give a broad overall picture of contemporary group theory, with a special emphasis on geometric and topological methods. Topics covered include deformations and rigidity, wild metric complexes, generalized triangle groups,  $l_1$ -homology, HNN extensions, Eilenberg-Ganea conjecture, cyclically presented groups, Takashaki manifolds, wreath products, reduction formulae, group actions on graphs and designs, Grushko-Neumann theorem, variations on a theme of Higman and Conder.

J.-C. BIRGET, S. MARGOLIS, J. MEAKIN, M. SAPIR, (Editors). — **Algorithmic problems in groups and semigroups.** — Trends in mathematics. — Un vol. relié,  $16,5 \times 24$ , de VIII, 307 p. — ISBN 0-8176-4130-0. — Prix: SFr. 128.00. — Birkhäuser, Boston, 2000.

This book is an outgrowth of an International Conference on Algorithmic Problems in Groups and Semigroups, held in May of 1998 at the University of Nebraska-Lincoln. New results, interesting techniques, and often overlapping ideas from diverse fields are reflected in this collection of largely expository articles which cover topics in algorithmic group and semigroup theory, and computer science. This book can serve as a good introduction to algorithmic problems in groups and semigroups for graduate students and as a useful reference text for researchers in that area.

Thomas BREUER. — **Characters and automorphism groups of compact Riemann surfaces.** — London Mathematical Society lecture note series, vol. 280. — Un vol. relié,  $15 \times 23$ , de XII, 198 p. — ISBN 0-521-79809-4. — Prix: £24.95. — Cambridge University Press, Cambridge, 2000.

This book deals with automorphism groups of compact Riemann surfaces, of genus at least 2, viewed as factor groups of Fuchsian groups. The author uses modern methods from computational group theory and representation theory, providing classifications of all automorphism groups up to genus 48. The book also classifies the ordinary characters for several groups, arising from the action of automorphisms on the space of holomorphic Abelian differentials of a compact Riemann surface. This book is suitable for graduate students and researchers in group theory, representation theory, complex analysis and computer algebra.

Patrick DEHORNOY. — **Braids and self-distributivity.** — Progress in mathematics, vol. 192. — Un vol. relié,  $16,5 \times 24$ , de XIX, 623 p. — ISBN 3-7643-6343-6. — Prix: SFr. 148.00. — Birkhäuser, Basel, 2000.

The aim of this book is to present recently discovered connections between Artin's braid groups and left self-distributive systems, which are sets equipped with a binary operation satisfying the identity  $x(yz) = (xy)(xz)$ . Order properties are crucial. In the 1980s new examples of left self-distributive systems were discovered using unprovable axioms of set theory, and purely algebraic statements were deduced. The quest for elementary proofs of these statements led to a

general theory of self-distributivity centered on a certain group that captures the geometrical properties of this identity. This group happens to be closely connected with Artin's braid groups, and new properties of the braids naturally arose as an application, in particular the existence of a left invariant linear order, which subsequently received alternative topological constructions. The text proposes a first synthesis of this area of research. Three domains are considered here, namely braids, self-distributive systems, and set theory. Although not a comprehensive course on these subjects, the exposition is self-contained, and a number of basic results are established. In particular, the first chapters include a rather complete algebraic study of Artin's braid groups.

Ernst KLEINERT. — **Units in skew fields.** — Progress in mathematics, vol. 186. — Un vol. relié,  $16 \times 24$ , de VIII, 79 p. — ISBN 3-7643-6293-6. — Prix: SFr. 58.00. — Birkhäuser, Basel, 2000.

This book is devoted to a study of the unit groups of orders in skew fields, finite dimensional and central over the rational field; it thereby belongs to the field on noncommutative arithmetic. Its purpose is a synopsis of results and methods, including full proofs of the most important results. It is addressed to researchers in number theory and arithmetic groups.

Lev V. SABININ. — **Smooth quasigroups and loops.** — Mathematics and its applications, vol. 492. — Un vol. relié,  $16 \times 25$ , de XVI, 249 p. — ISBN 0-7923-5920-8. — Prix: Dfl. 210.00. — Kluwer Academic Publishers, Dordrecht, 1999.

This monograph presents the complete theory of smooth quasigroups and loops, as well as its geometric and algebraic applications. Based on a generalization of the Lie-group theory, it establishes new backgrounds for differential geometry in the form of nonlinear geometric algebra and "loopuscular" geometry. It will prove useful in applications in such diverse fields as mathematical physics, relativity, Poisson and symplectic mechanics, quantum gravity, and dislocation theory, etc.

Marcus DU SAUTOY, Dan SEGAL, Aner SHALEV, (Editors). — **New horizons in pro- $p$  groups.** — Progress in mathematics, vol. 184. — Un vol. relié,  $16,5 \times 24$ , de XIII, 423 p. — ISBN 0-8176-4171-8. — Prix: SFr. 148.00. — Birkhäuser, Boston, 2000.

The impetus for current research in pro- $p$  groups comes from four main directions: from new applications in number theory, which continue to be a source of deep and challenging problems; from the traditional problem of classifying finite  $p$ -groups; from questions arising in infinite group theory; and finally, from the younger subject of "profinite group theory". Key features include: comprehensive introductory material and numerous examples throughout; first complete accounts in book form of the theory of groups acting on pro- $p$  trees, branch (Grigorchuk-type) groups, the Nottingham group; wide-ranging survey of Lie methods; definitive new results on the Golod-Shafarevich condition; detailed discussions of current research on classification of finite  $p$ -groups, enumeration of finite  $p$ -groups and of subgroups in infinite groups; new treatment of cohomology of  $p$ -adic analytic groups; connections with number theory: ramification theory in local fields, applications of  $p$ -adic Galois representations.

Geoff SMITH and Olga TABACHNIKOVA. — **Topics in group theory.** — Springer undergraduate mathematics series. — Un vol. broché,  $17 \times 24$ , de XIII, 255 p. — ISBN 1-85233-235-2. — Prix: DM 59.00. — Springer, Berlin, 2000.

Designed to support a reader engaged in a first serious group theory course, or a mathematically mature reader approaching the subject for the first time, this book reviews the essential. It

recaps the basic definitions and results, up to and including Lagrange's theorem, and then continues to explore topics such as the isomorphism theorems and group actions. Later chapters include material on chain conditions and finiteness conditions, free groups and the theory of presentations. In addition, a novel chapter of "entertainments" takes the basic theory and plays with it to obtain an assortment of results that will show a little of what can be done with the theoretical machinery.

## *Groupes topologiques ; groupes et algèbres de Lie*

Jürgen FUCHS. — **Affine Lie algebras and quantum groups.** — Cambridge monographs on mathematical physics. — Un vol. broché,  $19 \times 23,5$ , de XIV, 433 p. — ISBN 0-521-48412-X. — Prix: £23.95. — Cambridge University Press, Cambridge, 1992.

This is an introduction to the theory of affine Lie algebras, to the theory of quantum groups, and to the interrelationships between these two fields that are encountered in conformal field theory. The description of affine algebras covers the classification problem, the connection with loop algebras, and representation theory including modular properties. The necessary background from the theory of semisimple Lie algebras is also provided. The discussion of quantum groups concentrates on deformed enveloping algebras and their representation theory, but other aspects such as R-matrices and matrix quantum groups are also dealt with.

Karl-Hermann NEEB. — **Holomorphy and convexity in Lie theory.** — De Gruyter expositions in mathematics, vol. 28. — Un vol. relié,  $17 \times 25$ , de XXI, 778 p. — ISBN 3-11-015669-5. — Prix: DM 298.00. — Walter de Gruyter, Berlin, 2000.

*From the preface:* "This monograph is devoted to the circle of ideas connecting *holomorphic* and unitary representations with invariant *convexity in Lie algebras*. The background of these ideas comprises many classical concepts... The irreducible unitary representations of Lie groups we are dealing with in this book are highest weight representations; in some sense these are infinite-dimensional analogs of irreducible representations of compact groups. Among the irreducible unitary representations, they can be characterized by the property that they permit a holomorphic extension to a certain complex manifold  $S$  which is a semigroup containing the group in its boundary... The *main objective* of this book is to describe the interplay between holomorphic representations of complex semigroups, their complex geometry and analysis, and invariant convexity in the Lie algebra  $\mathfrak{g}$  and its dual  $\mathfrak{g}^*$ . We briefly refer to this circle of ideas as *holomorphic representation theory*.

## *Fonctions de variables réelles*

N.L. CAROTHERS. — **Real analysis.** — Un vol. broché,  $17,5 \times 25,5$ , de XIII, 401 p. — ISBN 0-521-49756-6 (relié: 0-521-49749-3). — Prix: £19.95 (relié: £52.50). — Cambridge University Press, Cambridge, 2000.

This is a course in real analysis directed at advanced undergraduates and beginning graduate students in mathematics and related fields. Presupposing only a modest background in real analysis or advanced calculus, the book offers something to specialists and non-specialists. The course consists of three major topics: metric and normed linear spaces, function spaces, and Lebesgue measure and integration on the line. In an informal style, the author gives motivation and overview of new ideas, while supplying full details and proofs. He includes historical commentary, recommends articles for specialists and non-specialists, and provides exercises and suggestions for further study.