

Topologie des variétés, analyse globale et analyse des variétés

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in connection with the Prague Topological Symposium, held in 2001. During the last 10 years the focus in general topology changed and therefore the selection of topics differs slightly from those chosen in 1992. The following areas experienced significant developments: topological groups, function spaces, dimension theory, hyperspaces, selections, geometric topology (including infinite-dimensional topology and the geometry of Banach spaces). Of course, not every important topic could be included in this book. Except surveys, the book contains several historical essays written by eminent topologists.

Topologie algébrique

Hans-Joachim BAUES. — **The homotopy category of simply connected 4-manifolds.** — London Mathematical Society lecture note series, vol. 297. — Un vol. broché, 15×23 , de x, 298 p. — ISBN 0-521-53103-9. — Prix: £ 24.95. — Cambridge University Press, Cambridge, 2003.

The homotopy type of a closed simply connected 4-manifold is determined by the intersection form. The homotopy classes of maps between two such manifolds, however, do not coincide with the algebraic morphisms between intersection forms. The problem therefore arises of computing the homotopy classes of maps algebraically and determining the law of composition for such maps. This problem is solved in the book by introducing new algebraic models of a 4-manifold.

Jiří MATOUŠEK. — **Using the Borsuk-Ulam theorem: lectures on topological methods in combinatorics and geometry.** — Universitext. — Un vol. broché, $15,5 \times 23,5$, de xii, 196 p. — ISBN 3-540-00362-2. — Prix: € 39.95. — Springer, Berlin, 2003.

A number of important results in combinatorics, discrete geometry, and theoretical computer science have been proved by surprising applications of algebraic topology. While the results are quite famous, their proofs and the underlying methods are not so widely understood. This textbook explains elementary but powerful topological methods based on the Borsuk-Ulam theorem and its generalizations. It covers many substantial results, sometimes with proofs simpler than those in the original papers. At the same time, it assumes no prior knowledge of algebraic topology, and all the required topological notions and results are gradually introduced. History, additional results, and references are presented in separate sections.

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Gerhard BURDE, Heiner ZIESCHANG. — **Knots.** — Second revised and extended edition. — De Gruyter studies in mathematics, vol. 5. — Un vol. relié, $18 \times 24,5$, de xii, 559 p. — ISBN 3-11-017005-1. — Prix: € 69.16. — Walter de Gruyter, Berlin, 2003.

This book is an introduction to classical knot theory. Topics covered include: different constructions of knots, knot diagrams, knot groups, fibred knots, characterisation of torus knots, prime decomposition of knots, cyclic coverings and Alexander polynomials and modules together with the free differential calculus, braids, branched coverings and knots, Montesinos links, representations of knot groups, surgery of 3-manifolds and knots. Knot theory has expanded enormously since the first edition of this book published in 1985. A special feature of the second edition is the introduction to two new constructions of knot invariants, namely the Jones and homfly polynomials. The book contains many figures and some tables of invariants of knots and an extensive bibliography. This comprehensive account is an indispensable reference source for anyone interested in both classical and modern knot theory.

Jorge IZE, Alfonso VIGNOLI. — **Equivariant degree theory.** — De Gruyter series in non-linear analysis and applications, vol. 8. — Un vol. relié, $18 \times 24,5$, de XIX, 361 p. — ISBN 3-11-017570-9. — Prix : € 98.00. — Walter de Gruyter, Berlin, 2003.

This book presents a new degree theory for maps which commute with a group of symmetries. This degree is no longer a single integer but an element of the group of equivariant homotopy classes of maps between two spheres and depends on the orbit types of the spaces. The authors develop completely the theory and applications of this degree in a self-contained presentation starting with only elementary facts. The first chapter explains the basic tools of representation theory, homotopy theory and differential equations needed in the text. The degree is defined and its main abstract properties are derived. The next part is devoted to the study of equivariant homotopy groups of spheres and to the classification of equivariant maps in the case of Abelian actions. These groups are explicitly computed and the effects of symmetry breaking, products and composition are thoroughly studied. The last part of the book deals with computations of the equivariant index of an isolated orbit and of an isolated loop of stationary points. Here differential equations in a variety of situations are considered. Periodic solutions of Hamiltonian systems, in particular spring-pendulum systems are studied as well as Hopf bifurcation for all these situations.

Colin MACLACHLAN, Alan W. REID. — **The arithmetic of hyperbolic 3-manifolds.** — Graduate texts in mathematics. — Un vol. relié, 16×24 , de XIII, 463 p. — ISBN 0-387-98386-4. — Prix : € 64.95. — Springer, New York, 2003.

For the past twenty-five years, the Geometrization Program of Thurston has been a driving force for research in 3-manifold topology. This has inspired a surge of activity investigating hyperbolic 3-manifolds (and Kleinian groups), as these manifolds form the largest and least well-understood class of compact 3-manifolds. Familiar and new tools from diverse areas of mathematics have been utilized in these investigations, from topology, geometry, analysis, group theory, and, from the point of view of this book, algebra and number theory. This book is aimed at readers already familiar with the basics of hyperbolic 3-manifolds or Kleinian groups, and it is intended to introduce them to the interesting connections with number theory and the tools that will be required to pursue them. While there are a number of texts that cover the topological, geometric, and analytical aspects of hyperbolic 3-manifolds, this book is unique in that it deals exclusively with the arithmetic aspects, which are not covered in other texts.

Liviu I. NICOLAESCU. — **The Reidemeister torsion of 3-manifolds.** — De Gruyter studies in mathematics, vol. 30. — Un vol. relié, $17,5 \times 24,5$, de XIV, 249 p. — ISBN 3-11-017383-2. — Prix : € 84.00. — Walter de Gruyter, Berlin, 2003.

This is a state of the art introduction to the work of Franz-Reidemeister, Meng-Taubes, Turaev, and the author on the concept of torsion and its generalizations. Torsion is the oldest topological (but not with respect to homotopy) invariant that in its almost eight decades of existence has been at the centre of many important and surprising discoveries. During the past decade, in the work of Vladimir Turaev, new points of view have emerged, which turned out to be the “right ones” as far as gauge theory is concerned. The book features mostly these new aspects of this venerable concept. Particular emphasis is upon the many and rather diverse concrete examples and techniques which capture the subtleties of the theory better than any abstract general result. Many of these examples and techniques never appeared in print before, and their choice is often justified by ongoing current research on the topology of surface singularities.