Topologie des variétés, analyse globale et analyse des variétés

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sequences and some of their most spectacular applications. The first third of the book treats the algebraic foundations for this sort of homological algebra, starting from informal calculations, to give the novice a familiarity with the range of applications possible. The heart of the book is an exposition of the classical examples from homotopy theory, with chapters on the Leray-Serre spectral sequence, the Eilenberg-Moore spectral sequence, the Adams spectral sequence. The last part of the book treats applications throughout mathematics, including the theory of knots and links, algebraic geometry, differential geometry and algebra.

Topologie des variétés, analyse globale et analyse des variétés

C.K. ANAND, P. BAIRD, E. LOUBEAU and J.C. WOOD. — **Harmonic morphisms, harmonic maps, and related topics.** — Chapman & Hall/CRC research notes in mathematics, vol. 413. — Un vol. broché, 15,5×23,5, de 309 p. — ISBN 1-58488-032-5. — Prix: £39.99. — Chapman & Hall/CRC, Boca Raton, 2000.

This volume reports the proceedings of the conference in the city of Brest and forms the first work primarily devoted to harmonic morphisms, bringing together contributions from the founders of the subject, leading specialists, and experts in other related fields. Starting with "The beginnings of harmonic morphisms", which provides the essential background, the first section includes papers on the stability of harmonic morphisms, global properties, harmonic polynomial morphisms, Bochner technique, f-structures, symplectic harmonic morphisms, and discrete harmonic morphisms. The second section addresses the wider domain of harmonic maps and contains some of the most recent results on harmonic maps and surfaces. The final section highlights the rapidly developing subject of constant mean curvature surfaces.

Sylvain CAPPELL, Andrew RANICKI and Jonathan ROSENBERG, (Editors). — **Surveys on surgery theory, vol. 2: papers dedicated to C.T.C. Wall.** — Annals of mathematics studies, vol. 149. — Un vol. broché, 15,5×23,5, de VII, 449 p. — ISBN 0-691-08815-2. — Prix: US$35.00. — Princeton University Press, Princeton, N.J., 2001.

The sixtieth birthday of C.T.C. Wall led the editors of this volume to reflect on the extraordinary accomplishments of surgery theory as well as its current enormously varied interactions with algebra, analysis, and geometry. Workers in many of these areas have often lamented the lack of a single source surveying surgery theory and its applications. Because no person could write such a survey, the editors asked a variety of experts to report on the areas of current interest. The topics covered include current applications of surgery, Wall's finiteness obstruction, algebraic surgery, automorphisms and embeddings of manifolds, surgery theoretic methods for the study of group actions and stratified spaces, metrics of positive scalar curvature, and surgery in dimension four. In addition to the editors, contributors are S. Ferry, M. Weiss, B. Williams, T. Goodwillie, J. Klein, S. Weinberger, B. Hughes, S. Stolz, R. Kirby, L. Taylor, and F. Quinn.

Klaus JÄNICH. — **Vector analysis.** — Translated by Leslie Kay. — Undergraduate texts in mathematics. — Un vol. relié, 18,5×24, de XIV, 281 p. — ISBN 0-387-98649-9. — Prix: DM 69.00. — Springer, New York, 2001.

Classical vector analysis deals with vector fields, the gradient, divergence, and curl operators, line, surface, and volume integrals, and the integral theorems of Gauss, Green, and Stokes. Modern vector analysis distils these into the Cartan calculus and a general form of Stokes' theorem. This essentially modern text carefully develops vector analysis on manifolds, reinterprets it from the classical viewpoint (and with the classical notation) for three-dimensional Euclidean space, and then goes on to introduce de Rham cohomology and Hodge theory. The material is accessible to an undergraduate student with calculus, linear algebra, and some topology as prerequisites.

Michaël KAPOVICH. — **Hyperbolic manifolds and discrete groups.** — Progress in mathematics, vol. 183. — Un vol. relié, 16×24, de xxv, 476 p. — ISBN 0-8176-3904-7. — Prix: SFr. 138.00. — Birkhäuser, Boston, 2001.

This work is at the crossroads of several branches of mathematics, including hyperbolic geometry, discrete groups, 3-dimensional topology, geometric group theory and complex analysis. The main focus throughout the text is on the "Big Monster", that is, on Thurston's hyperbolization theorem, which has completely changed the landscape of 3-dimensional topology and Kleinian group theory. *Topics and features:* First complete proof of Thurston's hyperbolization theorem in the generic case; Presentation of a number of open problems and conjectures; Diverse mathematical topics laid out in systematic fashion, including an extended treatment of the theory of Kleinian groups and group actions on trees; Extensive bibliography of related literature.

Leonid POLTEROVICH. — **The geometry of the group of symplectic diffeomorphisms.** — Lectures in mathematics, ETH Zürich. — Un vol. broché, 17×24, de XII, 132 p. — ISBN 3-7643-6432-7. — Prix: SFr. 34.00. — Birkhäuser, Basel, 2001.

In the past decade this new geometry has been intensively studied in the framework of symplectic topology with the use of modern techniques such as Gromov's theory of pseudo-holomorphic curves, Floer homology and the Guillemin-Sternberg-Lerman theory of symplectic connections. Furthermore, it opens up the intriguing prospect of using an alternative geometric intuition in dynamics. This book provides an essentially self-contained introduction to these developments and includes recent results on diameter, geodesics and growth of one-parameter subgroups in Hofer's geometry, as well as applications to dynamics and ergodic theory. It is addressed to researchers and students from the graduate level onwards.

Gang TIAN. — **Canonical metrics in Kähler geometry.** — Lectures in mathematics, ETH Zürich. — Un vol. broché, 17×24, de 100 p. — ISBN 3-7643-6194-8. — Prix: SFr. 32.00. — Birkhäuser, Basel, 2000.

There has been fundamental progress in complex differential geometry in the last two decades. For one, the uniformization theory of canonical Kähler metrics has been established in higher dimensions, and many applications have been found, including the use of Calabi-Yau spaces in superstring theory. The aim of this monograph is to give an essentially self-contained introduction to the theory of canonical Kähler metrics on complex manifolds. It also presents the reader with some advanced topics in complex differential geometry not easily found elsewhere. The topics include Calabi-Futaki invariants, extremal Kähler metrics, the Calabi-Yau theorem on existence of Kähler Ricci-flat metrics, and recent progress on Kähler-Einstein metrics with positive scalar curvature. Applications of Kähler-Einstein metrics to the uniformization theory are also discussed.

Vladimir TURAEV. — **Introduction to combinatorial torsions: notes taken by Felix Schlenk.** — Lectures in mathematics ETH Zürich. — Un vol. broché, 17×24, de VIII, 123 p. — ISBN 3-7643-6403-3. — Prix: SFr. 32.00. — Birkhäuser, Basel, 2001.

The first two chapters of this book cover algebraic foundations of the theory of torsions and various topological constructions of torsions due to K. Reidemeister, J.H.C. Whitehead, J. Milnor and the author. We also discuss connections between the torsions and the Alexander polynomials of links and 3-manifolds. The third chapter of the book deals with so-called refined torsions and the related additional structures on manifolds, specifically homological orientations and Euler structures. As an application, we give a construction of the multivariable Conway

polynomial of links in homology 3-spheres. At the end of the book, the author describe the recent results of G. Meng, C.H. Taubes and the author on the connections between the refined torsions and the Seiberg-Witten invariant of 3-manifolds.

Probabilités et processus stochastiques

Marek CAPIŃSKI, Tomasz ZASTAWNIAK. — **Probability through problems.** — Problem books in mathematics. — Un vol. relié, 16,5×24, de VIII, 257 p. — ISBN 0-387-95063-X. — Prix: DM 109.00. — Springer, New York, 2001.

This book of problems has been designed to accompany an undergraduate course in probability. The only prerequisite are basic algebra and calculus. Each chapter is divided into three parts: problems, hints, and solutions. To make the book self-contained, all problem sections include expository material. Definitions and statements of important results are interlaced with relevant problems. The problems have been selected to motivate abstract definitions by concrete examples and to lead in manageable steps toward general results, as well as to provide exercises based on the issues and techniques introduced in each chapter. The book is intended as a challenge to involve students as active participants in the course.

Michael DEMUTH, Jan A. VAN CASTEREN. — **Stochastic spectral theory for selfadjoint Feller operators: a functional integration approach.** — Probability and its applications. — Un vol. relié, 16×24, de XII, 463 p. — ISBN 3-7643-5887-4. — Prix: SFr. 168.00. — Birkhäuser, Basel, 2000.

A beautiful interplay between probability theory (Markov processes, martingale theory) on the one hand and operator and spectral theory on the other yields a uniform treatment of several kinds of Hamiltonians such as the Laplace operator, relativistic Hamiltonian, Laplace-Beltrami operator, and generators of Ornstein-Uhlenbeck processes. For such operators regular and singular perturbations of order zero and their spectral properties are investigated. A complete treatment of the Feynman-Kac formula is given. The theory is applied to such topics as compactness or trace class properties of differences of Feynman-Kac semigroups, preservation of absolutely continuous and/or essential spectra and completeness of scattering systems.

Evarist GINÉ, David M. MASON, Jon A. WELLNER, (Editors). — **High dimensional probability II.** — Un vol. relié, 16×24, de X, 510 p. — ISBN 0-8176-4160-2. — Prix: SFr. 198.00. — Birkhäuser, Boston, 2000.

High dimensional probability is a rapidly growing field. Many new ideas, results, and directions in this evolving subject are explored in this volume, an outgrowth of the Second International Conference on High Dimensional Probability, held at the University of Washington, Seattle. The notion of high dimensional probability, as represented by these papers, encompasses a wide range of topics in both statistics and probability theory, centering around the development and application of powerful methods in the areas of probability on Banach spaces, Gaussian process theory, and strong and distributional approximation. Considered as a whole, this work provides researchers and graduate students with a fine introduction to the strength and applicability of these methods. Topics covered include: exponential and moment inequalities for a variety of processes, estimates for Gaussian processes, limit theorems for sums of independent random vectors and empirical processes, strong approximation and embedding in arbitrary dimensions, multidimensional distribution theory, statistical function estimation, multivariate statistics.