Topologie des variétés, analyse globale et analyse des variétés

John M. LEE. — **Introduction to smooth manifolds.** — Graduate texts in mathematics, vol. 218. — Un vol. broché, 15,5×23,5, de XVII, 628 p. — ISBN 0-387-95448-1. — Prix: € 54.95. — Springer, New York, 2003.

The goal of this book is to familiarize students with the tools they will need in order to use manifolds in mathematical or scientific research — smooth structures, tangent vectors and covectors, vector bundles, immersed and embedded submanifolds, tensors, differential forms, de Rham cohomology, vector fields, flows, foliations, Lie derivatives, Lie groups, Lie algebras, and more. The approach is as concrete as possible. Along the way, it introduces the readers to some of the most important examples of geometric structures that manifolds can carry, such as Riemannian metrics, symplectic structures, and foliations. The book is aimed at students who already have a solid acquaintance with general topology, the fundamental group, and covering spaces, as well as basic undergraduate linear algebra and real analysis.

Topologie algébrique

Marcelo AGUILAR, Samuel GITLER, Carlos PRIETO. — **Algebraic topology from a homotopical viewpoint**. — Universitext. — Un vol. relié, 24×16, de XXIX, 478 p. — ISBN 0-387-95450-3. — Prix: SFr. 133.00. — Springer, Berlin, 2002.

The purpose of this book is to introduce algebraic topology using the novel approach of homotopy theory, an approach with clear applications in algebraic geometry as understood by Lawson and Voevodsky. This method allows the authors to cover the material more efficiently than the more common method using homological algebra. The basic concepts of homotopy theory, such as fibrations and cofibrations, are used to construct singular homology and cohomology, as well as K-theory. Throughout the text many other fundamental concepts are introduced, including the construction of the characteristic classes of vector bundles. Although functors appear constantly throughout the book, no previous knowledge about category theory is expected from the reader.

Topologie des variétés, analyse globale et analyse des variétés

Jan CNOPS. — **An introduction to Dirac operators on manifolds.** — Progress in mathematical physics, vol. 24. — Un vol. relié, 16×24, de X, 211 p. — ISBN 0-8176-4298-6. — Prix: SFr. 116.00. — Birkhäuser, Boston, 2002.

In this essentially self-contained work, the basic ideas underlying the concept of Dirac operators are explored. Starting with Clifford algebras and the fundamentals of differential geometry, the text focuses on two main properties, namely, conformal invariance, which determines the local behavior of the operator, and the unique continuation property dominating its global behavior. Spin groups and spinor bundles are covered, as well as the relations with their classical counterparts, orthogonal groups and Clifford bundles. The reader will benefit, however, from some knowledge of complex analysis, which gives the simplest example of a Dirac operator. More advanced readers will appreciate the fresh approach to the theory as well as the new results on boundary value theory.

Frédéric HÉLEIN. — **Harmonic maps, conservation laws and moving frames.** — Second edition. — Cambridge tracts in mathematics, vol. 150. — Un vol. relié, 16×23, de XXI, 264 p. — ISBN 0-521-81160-0. — Prix: £47.50. — Cambridge University Press, Cambridge, 2002.

This book provides an accessible and self-contained introduction to harmonic map theory and its analytical aspects, covering recent developments in the regularity theory of weakly harmonic maps. The book begins by introducing these concepts, stressing the interplay between geometry, the role of symmetries and weak solutions. The reader is then presented with a guided

tour of the theory of completely integrable systems for harmonic maps, followed by two chapters devoted to recents results on the regularity of weak solutions. A self-contained presentation of "exotic" functional spaces from the theory of harmonic analysis is given and these tools are then used for proving regularity results. The importance of conservation laws is stressed and the concept of a "Coulomb moving frame" is explained in detail. The book ends with further applications and illustrations of Coulomb moving frames to the theory of surfaces.

Claus HERTLING. — **Frobenius manifolds and moduli spaces for singularities.** — Cambridge tracts in mathematics, vol. 151. — Un vol. relié, 16×23,5, de IX, 270 p. — ISBN 0-521-812968. — Prix : £45.00. — Cambridge University Press, Cambridge, 2002.

For those working in singularity theory or other areas of complex geometry, this book will open the door to the study of Frobenius manifolds. This class of manifolds is now known to be relevant for the study of singularity theory, quantum cohomology, mirror symmetry, symplectic geometry and integrable systems. The first part of the book explains the theory of manifolds with a multiplication on the tangent bundle. The second presents a simplified explanation of the construction of Frobenius manifolds in singularity theory along with all the necessary tools and several applications.

Alan HUCKLEBERRY, Tilmann WURZBACHER, (Editors). — **Infinite dimensional Kähler manifolds**. — DMV Seminar, vol. 31. — Un vol. broché, 24×17, de XIII, 375 p. — ISBN 3-7643-6602-8. — Prix : SFr. 58.00. — Birkhäuser, Basel, 2002.

Infinite dimensional manifolds, Lie groups and algebras arise naturally in many areas of mathematics and physics. Having been used mainly as a tool for the study of finite dimensional objects, the emphasis has changed and they are now frequently studied for their own independent interest. The initial chapters are devoted to a rather self contained introduction to group actions on complex and symplectic manifolds and to Borel-Weil theory in finite dimensions. These are followed by a treatment of the basics of infinite dimensional Lie groups, their actions and their representations. Finally, a number of more specialized and advanced topics are discussed, e.g., Borel-Weil theory for loop groups, aspects of the Virasoro algebra, (gauge) group actions and determinant bundles, and second quantization and the geometry of the infinite dimensional Grassmann manifold.

Gerald W. JOHNSON and Michel L. LAPIDUS. — **The Feynman integral and Feynman's operational calculus.** — Oxford mathematical monographs. — Un vol. broché, 15,5×23,5, de XVIII, 771 p. — ISBN 0-19-851572-3. — Prix : £40.00. — Clarendon Press, Oxford, 2000.

This book provides the most comprehensive mathematical treatment to date of the mathematically beautiful but difficult subjects of the Feynman path integral and Feynman's operational calculus. It is accessible to mathematicians, mathematical physicists and theoretical physicists. Including new results and much material previously only available in the research literature, this book discusses both the mathematics and physics background that motivate the study of the Feynman integral and Feynman's operational calculus, and also provides more detailed proofs of the central results.

Serge LANG. — **Introduction to differentiable manifolds.** — Second edition. — Universitext. — Un vol. relié, 16×24, de XI, 250 p. — ISBN 0-387-95477-5. — Prix : € 59.95. — Springer, Berlin, 2002.

This book gives an introduction to the basic concepts which are used in differential topology, differential geometry, and differential equations. A certain number of concepts are essential for

all three of these areas, and are so basic and elementary that it is worthwhile to collect them together so that more advanced expositions can be given without having to start from the very beginning. The concepts are concerned with the general basic theory of differential manifolds. As a result, this book can be viewed as a prerequisite to *Fundamentals of Differential Geometry.* Since this book is intended as a text to follow advanced calculus, manifolds are assumed finite dimensional. In the new edition, the author has made numerous corrections to the text and he has added a chapter on applications of Stokes' theorem.

Yiming LONG. — **Index theory for symplectic paths with applications.** — Progress in mathematics, vol. 207. — Un vol. relié, 16×24, de XXIV, 380 p. — ISBN 3-7643-647-8. — Prix: SFr. 168.00. — Birkhäuser, Basel, 2002.

This book gives a systematic introduction to the index theory for symplectic matrix paths and its iteration theory, as well as applications to periodic solution problems of nonlinear Hamiltonian systems. Among the topics covered are the algebraic and topological properties of symplectic matrices and groups, the index theory for symplectic paths, relations with other Morse-type index theories, Bott-type iteration formulae, splitting numbers, precise index iteration formulae, various index iteration inequalities, and common index properties of finitely many symplectic paths. The applications of these concepts yield new approaches to some outstanding problems and important progress on their solutions. Particular attention is given to the minimal period solution problem of Hamiltonian systems, the existence of infinitely many periodic points of the Poincaré map of Lagrangian systems on tori, and the multiplicity and stability problems of closed characteristics on convex compact smooth hypersurfaces in $2n$-dimensional Euclidean vector space.

Probabilités et processus stochastiques

Klaus BICHTELER. — **Stochastic integration with jumps.** — Encyclopedia of mathematics and its applications, vol. 89. — Un vol. relié, 16×24, de XIII, 501 p. — ISBN 0-521-81129-5.— Prix: £70.00. — Cambridge University Press, Cambridge, 2002.

Stochastic processes with jumps and random measures are gaining importance as drivers in applications like financial mathematics and signal processing. This book develops the stochastic integration theory for both integrators (semimartingales) and random measures from a common point of view. Highlights feature the DCT and Egoroff's theorem, as well as comprehensive analogs to results from ordinary integration theory, for instance, previsible envelopes and an algorithm computing stochastic integrals of càglàd integrands pathwise. Full proofs are given for all results, and motivation is stressed throughout. A large appendix contains most of the analysis that readers will need as a prerequisite. A comprehensive reference list and index of notation are also provided. Extra material is available from the book's Web site at http://www.ma.utexas.edu/users/cup.

Erwin BOLTHAUSEN, Alain-Sol SZNITMAN. — **Ten lectures on random media.** — DMV Seminar, vol. 32. — Un vol. broché, 24×17, 116 p. — ISBN 3-7643-6703-2. — Prix: SFr. 42.00. — Birkhäuser, Basel, 2002.

The field of random media has been the object of intensive activity over the last twenty-five years. It gathers a variety of models generally originating from physical sciences, where certain materials or substances have defects or inhomogeneities. This feature can be taken into account by letting the medium be random. Randomness in the medium turns out to cause very unexpected effects, especially in the large-scale behavior of some of these models. What in the beginning was often deemed to be a simple toy-model ended up as a major mathematical