

# Topologie des variétés, analyse globale et analyse des variétés

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all robust features of a smooth surface, which are rarely treated in elementary courses on differential geometry, are considered here in detail. These features are of immediate relevance in modern areas of application such as interpretation of range data from curved surfaces and the processing of magnetic resonance and cat-scan images. The text is based on extensive teaching at Liverpool University to audiences of advanced undergraduate and beginning postgraduate students in mathematics.

Gabor TOTH. — **Finite Möbius groups, minimal immersions of spheres, and moduli.** — Universitext. — Un vol. relié,  $16 \times 24$ , de xvi, 317 p. — ISBN 0-387-95323-X. — Prix: € 74.95. — Springer, New York, 2002.

In this book, the author traces the development of the study of spherical minimal immersions over the past 30-plus years, including Takahashi's 1966 proof regarding the existence of isometric minimal immersions, DoCarmo and Wallach's study of the uniqueness of the standard minimal immersions that have been obtained by the equivariant construction as  $SU(2)$ -orbits, first used by Mashimo in 1984 and then later by DeTurck and Ziller in 1992. In trying to make this monograph accessible not just to research mathematicians but to mathematics graduate students as well, the author included sizeable pieces of material from upper-level undergraduate courses, additional graduate level topics such as Felix Klein's classic treatise of the icosahedron, and a valuable selection of exercises.

### *Topologie algébrique*

Allen HATCHER. — **Algebraic topology.** — Un vol. broché,  $17,5 \times 25,5$ , de xii, 544 p. — ISBN 0-521-79540-0 (relié: 0-521-79160X). — Prix: £20.95 (relié: £60.00). — Cambridge University Press, Cambridge, 2002.

This geometrically flavored introduction to algebraic topology has the dual goals of serving as a textbook for a standard graduate-level course and as a background reference for many additional topics that do not usually fit into such a course. The broad coverage includes both the homological and homotopical sides of the subject. Care has been taken to present a readable, self-contained exposition, with many examples and exercises, aimed at the student or the researcher from another area of mathematics seeing the subject for the first time.

### *Topologie des variétés, analyse globale et analyse des variétés*

Stancho DIMIEV, Kouei SEKIGAWA, (Editors). — **Perspectives of complex analysis, differential geometry and mathematical physics.** — Proceedings of the 5<sup>th</sup> International Workshop on Complex Structures and Vector Fields, St. Konstantin, Bulgaria, 3-9 September 2000. — Un vol. relié,  $16 \times 23$ , de x, 208 p. — ISBN 981-02-4597-1. — Prix: £58.00. — World Scientific, Singapore, 2001.

This workshop brought together specialists in complex analysis, differential geometry, mathematical physics and applications for stimulating cross-disciplinary discussions. The lectures presented ranged over various current topics in those fields. The proceedings will be of value to graduate students and researchers in complex analysis, differential geometry and theoretical physics, and also related fields. 18 papers by V.P. Kostov, L.N. Apostolova, M.S. Marinov, K.P. Petrov, A.M. Kytmanov, S.G. Myslivets, S. Dimiev, J. Ławrynówicz, L.M. Tovar, Y. Hashimoto, K. Ohba, K. Kikuchi, S. Nagami, T. Adachi, H. Hashimoto, K. Mashimo, G. Ganchev, V. Mihova, V. Milousheva, M. Hristov, M. Manev, B.G. Dimitrov, I.B. Pestov, S. Manoff, G. Zlatanov.

S. K. DONALDSON. — **Floer homology groups in Yang-Mills theory.** — Cambridge tracts in mathematics, vol. 147. — Un vol. relié,  $16 \times 24$ , de VII, 236 p. — ISBN 0-521-80803-0. — Prix: £ 50.00. — Cambridge University Press, Cambridge, 2002.

The concept of Floer homology has been one of the most striking developments in differential geometry over the past 20 years. It yields rigorously defined invariants which can be viewed as homology groups of infinite-dimensional cycles. The ideas have led to great advances in the areas of low-dimensional topology and symplectic geometry and are intimately related to developments in Quantum Field Theory. The first half of this book gives a thorough account of Floer's construction in the context of gauge theory over 3- and 4-dimensional manifolds. The second half works out some further technical developments of the theory, and the final chapter outlines some research developments for the future – including a discussion of the appearance of modular forms in the theory.

Laurent SALOFF-COSTE. — **Aspects of Sobolev-type inequalities.** — London Mathematical Society lecture note series, vol. 289. — Un vol. broché,  $16 \times 23$ , de X, 190 p. — ISBN 0-521-00607-4. — Prix: £ 25.95. — Cambridge University Press, Cambridge, 2002.

This book focuses on Poincaré, Nash and other Sobolev-type inequalities and their applications to the Laplace and heat diffusion equations on Riemannian manifolds. Applications covered include the ultracontractivity of the heat diffusion semi-group, Gaussian heat kernel bounds, the Rozenblum-Lieb-Cwikel inequality and elliptic and parabolic Harnack inequalities. Emphasis is placed on the role of families of local Poincaré and Sobolev inequalities. The text provides the first self-contained account of the equivalence between the uniform parabolic Harnack inequality, on the one hand, and the conjunction of the doubling volume property and Poincaré's inequality on the other.

Jeffrey R. WEEKS. — **The shape of space.** — Second edition. — Pure and applied mathematics, vol. 249. — Un vol. relié,  $16 \times 24$ , de XII, 382 p. — ISBN 0-8247-0709-5. — Prix: US\$ 35.00. — Marcel Dekker, New York, 2002.

Maintaining the standard of excellence set by the previous edition, this lighthearted textbook surveys the basic geometry of two- and three-dimensional spaces — stretching students' minds as they learn to visualize new possibilities for the shape of our universe. This book is profusely illustrated with examples and engaging exercises... offers three new chapters that apply topology to cosmology... illustrates the connection between geometry and the behaviour of the physical universe... seeks patterns in the arrangement of galaxies... explains how radiations remaining from the big bang may reveal the actual shape of the universe.

Weiping ZHANG. — **Lectures on Chern-Weil theory and Witten deformations.** — Nankai tracts in mathematics, vol. 4. — Un vol. relié,  $16 \times 23$ , de XI, 117 p. — ISBN 981-02-4685-4. — Prix: £ 19.00. — World Scientific, Singapore, 2001.

This book is based on the notes of a graduate course on differential geometry which the author gave at the Nankai Institute of Mathematics. It consists of two parts: the first part contains an introduction to the geometric theory of characteristic classes due to Shiing-shen Chern and André Weil, as well as a proof of the Gauss-Bonnet-Chern theorem based on the Mathai-Quillen construction of Thom forms; the second part presents analytic proofs of the Poincaré-Hopf index formula, as well as the Morse inequalities based on deformations introduced by Edward Witten.