<<现代几何学方法和应用（第3>>

图书基本信息

书名：<<现代几何学方法和应用（第3卷）>>

13位ISBN编号：9787506212649

10位ISBN编号：7506212641

出版时间：1999-11

出版时间：世界图书出版公司

作者：B.A.DubrovinA.T.Fomenkoet al.

内容概要

In expositions of the elements of topology it is customary for homology to be given a fundamental role. Since Poincare, who laid the foundations of topology, homology theory has been regarded as the appropriate primary basis for an introduction to the methods of algebraic topology. From homotopy theory, on the other hand, only the fundamental group and covering-space theory have traditionally been included among the basic initial concepts. Essentially all elementary classical textbooks of topology (the best of which is, in the opinion of the present authors, Seifert and Threlfall's A Textbook of Topology) begin with the homology theory of one or another classof complexes. Only at a later stage (and then still from a homological point of view) do fibre-space theory and the general problem of classifying homotopy classes of maps (homotopy theory) come in for consideration. However, methods developed in investigating the topology of differentiable manifolds, and intensively elaborated from the 1930s onwards (by Whitney and others), now permit a wholesale reorganization of the standard exposition Of the fundamentals of modern topology. In this new approach, which resembles more that of classical analysis, these fundamentals turn out to consist primarily of the elementary theory of smooth manifolds, homotopy theory based on these, and smooth fibre spaces. Furthermore, over the decade of the 1970s it became clear that exactly this complex of topological ideas and methods were proving to be fundamentally applicable in various areas of modern physics.

本书为英文版。

书籍目录

PrefaceCHAPTER 1 Homology and Cohomology. Computational Recipes1.Cohomology groups as classes ofclosed differential forms Their homotopy invariance2.The homology theory ofalgebraic complexes3.Simplicial complexes. Their homology and cohomology groups The classification of the two-dimensional closed surfaces4.Attaching cells to a topological space. Cell spaces. Theorems on the reduction of cell spaces. Homology groups and the fundamental groups of surfaces and certain other manifolds5.The singular homology and cohomology groups. Their homotogy invariance. The exact sequence of a pair. Relative homology groups6.The singular homology of cell complexes. Its equivalence with cell homology. Poincare duality in simplicial homology7.The homology groups ofa product ofspaces. Multiplication in cohomology rings. The cohomology theory of H-spaces and Lie groups. The cohomology of the unitary groups8.The homology theory offibre bundles (skew products)9.The extension problem for maps, homotopies, and cross-sections Obstruction cohomology classes9.1. The extension problem for maps9.2. The extension problem for homotopies9.3. The extension problem for cross-sections10. Homology theory and methods for computing homotopy groups. The Cartan-Serre theorem. Cohomology operations. Vector bundles10.1. The concept of a cohomology opcration. Examples10.2. Cohomology operations and Eilenberg-MacLane complexes10.3. Computation of the rational homotopy groups10.4. Application to vector bundles. Characteristic classes10.5. Classification of the Steenrod operations in low dimensions10.6. Computation of the first few nontrivial stable homotopy groups of pheres10.7. Stable homotopy classes ofmaps ofcell complexes11. Homology theory and the fundamental group12. The cohomology groups of hyperelliptic Riemann surfaces. Jacobitori. eodesics on multi-axis ellipsoids. Relationship to finite-gappotentials13. The simplest properties of Kahler manifolds Abelian tori14. Sheaf cohomologyCHAPTER 2 Critical Points of Smooth Functions and Homology Theory15. Morse functions and cell complexes16. The Morse inequalities17. Morse-Smale functions. Handles. Surfaces18. Poincare duality19. Critical points ofsmooth functions and the Lyusternik-Shnirelman category of a manifold20. Critical manifolds and the Morse inequalities. Functions with symmetry21. Critical points of functionals and the topology ofthe path space (m)22. Applications of the index theorem23. The periodic problem of the calculus of variations24. Morse functions on 3-dimensioal manifolds and Heegaard splittings25. Unitary Bott periodicity and higher-dimensional variational problems25.1. The theorem on unitary periodicity25.2. Unitary periodicity via the two-dimensional calculus of variations25.3. Onthogonal periodicity via the higher-dimensional calculus of variations26. Morse theory and certain motions in the planar n-body problemCHAPTER 3 Cobordisms and Smooth Structures27. Characteristic numbers. Cobordisms. Cycles and submanifolds The signature of a manifold27.1. Statement of the problem. The simplest facts about cobordisms The signature27.2. Thom complexes. Calculation of cobordisms (modulo torsion) The signature formula. Realization of cycles as submanifolds27.3. Some applications of the signature fonnula. The signature and the problem of the invariance of classes28. Smooth structures on the 7-dimensional sphere. The classification problem for smooth manifolds (normal invariants). Reidemeister torsion and the fundamental hypothesis (Hauptvermutung) ofcombinatorial topologyBibliographyAPPENDIX 1 (by S. P. Novikov)An Analogue of Morse Theory for Many-Valued Functions Certain Properties of Poisson BracketsAPPENDIX 2(by A. T. Fomenko) Plateau's Problem. Spectral Bordisms and Globally Minimal Surfaces in Riemannian ManifoldsIndexErrata to Parts 1 and 11

编辑推荐

In expositions of the elements of topology it is customary for homology to be given a fundamental role. Since Poincare, who laid the foundations of topology, homology theory has been regarded as the appropriate primary basis for an introduction to the methods of algebraic topology. From homotopy theory, on the other hand, only the fundamental group and covering-space theory have traditionally been included among the basic initial concepts. Essentially all elementary classical textbooks of topology (the best of which is, in the opinion of the present authors, Seifert and Threlfall's A Textbook of Topology) begin with the homology theory of one or another classof complexes. Only at a later stage (and then still from a homological point of view) do fibre-space theory and the general problem of classifying homotopy classes of maps (homotopy theory) come in for consideration. However, methods developed in investigating the topology of differentiable manifolds, and intensively elaborated from the 1930s onwards (by Whitney and others), now permit a wholesale reorganization of the standard exposition Of the fundamentals of modern topology. In this new approach, which resembles more that of classical analysis, these fundamentals turn out to consist primarily of the elementary theory of smooth manifolds, homotopy theory based on these, and smooth fibre spaces. Furthermore, over the decade of the 1970s it became clear that exactly this complex of topological ideas and methods were proving to be fundamentally applicable in various areas of modern physics.