Homotopy Methods In Topological Fixed

Periodic Differential Equations in the Plane Rafael Ortega 2019-05-06 Periodic differential equations appear in many contexts such as in the theory of nonlinear oscillators, in celestial mechanics, or in population dynamics with seasonal effects. The most traditional approach to study these equations is based on the introduction of small parameters, but the search of nonlocal results leads to the application of several topological tools. Examples are fixed point theorems, degree theory, or bifurcation theory. These well-known methods are valid for equations of arbitrary dimension and they are mainly employed to prove the existence of periodic solutions. Following the approach initiated by Massera, this book presents some more delicate techniques whose validity is restricted to two dimensions. These typically produce additional dynamical information such as the instability of periodic solutions, the convergence of all solutions to periodic solutions, or connections between the number of harmonic and subharmonic solutions. The qualitative study of periodic planar equations leads naturally to a class of discrete dynamical systems generated by homeomorphisms or embeddings of the plane. To study these maps, Brouwer introduced the notion of a translation arc, somehow mimicking the notion of an orbit in continuous dynamical systems. The study of the properties of these translation arcs is full of intuition and often leads to "non-rigorous proofs". In the book, complete proofs following ideas developed by Brown are presented and the final conclusion is the Arc Translation Lemma, a counterpart of the Poincaré–Bendixson theorem for discrete dynamical systems. Applications to differential equations and discussions on the topology of the plane are the two themes that alternate throughout the five chapters of the book.

Handbook of Topological Fixed Point Theory Robert F. Brown 2005-07-21 This book will be especially useful for post-graduate students and researchers interested in the fixed point theory, particularly in topological methods in nonlinear analysis, differential equations and dynamical systems. The content is also likely to stimulate the interest of mathematical economists, population dynamics experts as well as theoretical physicists exploring the topological dynamics.

Cohomological Methods in Homotopy Theory Jaume Aguade 2012-12-06 This book contains a collection of articles summarizing the state of knowledge in a large portion of modern homotopy theory. A call for articles was made on the occasion of an emphasis semester organized by the Centre de Recerca Matemtica in Bellaterra (Barcelona) in 1998. The main topics treated in the book include abstract features of stable and unstable homotopy, homotopical localizations, p-compact groups, H-spaces, classifying spaces for proper actions, cohomology of discrete groups, K-theory and other generalized cohomology theories, configuration spaces, and Lusternik-Schnirelmann category. The book is addressed to all mathematicians interested in homotopy theory and in geometric aspects of group theory. New research directions in topology are highlighted. Moreover, this informative and educational book serves as a welcome reference for many new results and recent methods.

Topological Fixed Point Theory of Multivalued Mappings Lech Górniewicz 2013-11-11 This book is an attempt to give a systematic presentation of results and meth ods which concern the fixed point theory of multivalued mappings and some of its applications. In selecting the material we have restricted ourselves to study ing topological methods in the fixed point theory of multivalued mappings and applications, mainly to differential inclusions. Thus in Chapter III the approximation (on the graph) method in fixed point theory of multi valued mappings is presented. Chapter IV is devoted to the homo logical methods and contains more general results, e. g. , the Lefschetz Fixed Point Theorem, the fixed point index and the topological degree theory. In Chapter V applications to some special problems in fixed point theory are formulated. Then in the last chapter a direct application's to differential inclusions are presented. Note that Chapter I and Chapter II have an auxiliary character, and only results con nected with the Banach Contraction Principle (see Chapter II) are strictly related to topological methods in the fixed point theory. In the last section of our book (see Section 75) we give a bibliographical guide and also signal some further results which are not contained in our monograph. The author thanks several colleagues and my wife Maria who read and com mented on the manuscript. These include J. Andres, A. Buraczewski, G. Gabor, A. Gorka, M. Gorniewicz, S. Park and A. Wieczorek. The author wish to express his gratitude to P. Konstanty for preparing the electronic version of this monograph.

Method of Guiding Functions in Problems of Nonlinear Analysis Valeri Obukhovskii 2013-05-13 This book offers a self-contained introduction to the theory of guiding functions methods, which can be used to study the existence of periodic solutions and their bifurcations in ordinary differential equations, differential inclusions and in control theory. It starts with the basic concepts of nonlinear and multivalued analysis, describes the classical aspects of the method of guiding functions, and then presents recent findings only available in the research literature. It describes essential applications in control theory, the theory of bifurcations, and physics, making it a valuable resource not only for “pure” mathematicians, but also for students and researchers working in applied mathematics, the engineering sciences and physics.

Dynamics and Numbers Sergiĭ Kolyada: 2016-07-27 This volume contains a collection of survey and research articles from the special program and international conference on Dynamics and Numbers held at the Max-Planck Institute for Mathematics in Bonn, Germany in 2014. The papers reflect the great diversity and depth of the interaction between number theory and dynamical systems and geometry in particular. Topics covered in this volume include symbolic dynamics, Bratelli diagrams, geometry of laminations, entropy, Nielsen theory, recurrence, topology of the moduli space of interval maps, and specification properties.

Global Homotopy Theory Stefan Schwede 2018-09-06 A comprehensive, self-contained approach to global equivariant homotopy theory, with many detailed examples and sample calculations.

Analysis and Computation of Fixed Points Stephen M. Robinson 2014-05-10 Analysis and Computation of Fixed Points contains the proceedings of a Symposium on Analysis and Computation of Fixed Points, held at the University of Wisconsin-Madison on May 7-8, 1979. The papers focus on the analysis and computation of fixed points and cover topics ranging from paths generated by fixed point algorithms to strongly stable stationary solutions in nonlinear programs. A simple reliable numerical algorithm for following homotopy paths is also presented. Comprised of nine chapters, this book begins by describing the techniques of numerical linear algebra that possess attractive stability properties and exploit sparsity, and their application to the linear systems that arise in algorithms that solve equations by constructing piecewise-linear homotopies. The reader is then introduced to two triangulations for homotopy fixed point algorithms with an arbitrary grid refinement, followed by a discussion on some generic properties of paths generated by fixed point algorithms. Subsequent chapters deal with topological perturbations in the numerical study of nonlinear eigenvalue and bifurcation problems; general equilibrium analysis of taxation policy; and solving urban general equilibrium models by fixed point methods. The book concludes with an evaluation of economic equilibrium under deformation of the economy. This monograph should be of interest to students and specialists in the field of mathematics.

Homotopy Methods in Algebraic Topology Nicholas Kuhn 2001-04-25 This volume presents the proceedings from the AMS-IMS-SIAM Summer Research Conference on Homotopy Methods in Algebraic Topology held at the University of Colorado (Boulder). The conference coincided with the sixtieth birthday of J. Peter May. An article is included reflecting his wide-ranging and influential contributions to the subject area. Other articles in the book discuss the ordinary, elliptic and real-oriented Adams spectral sequences, mapping class groups, configuration spaces, extended powers, operads, the telescope conjecture, p-compact groups, algebraic K theory, stable and unstable splittings, the calculus of functors, the E_{∞} tensor product, and equivariant cohomology theories. The book offers a compendious source on modern aspects of homotopy theoretic methods in many algebraic settings.

Topological Methods for Differential Equations and Inclusions John R. Graef 2018-09-25 Topological Methods for Differential Equations and Inclusions covers the important topics involving topological methods in the theory of systems of differential equations. The equivalence between a control system and

the corresponding differential inclusion is the central idea used to prove existence theorems in optimal control theory. Since the dynamics of economic, social, and biological systems are multi-valued, differential inclusions serve as natural models in macro systems with hysteresis.

Homotopy Theoretic Methods in Group Cohomology William G. Dwyer 2012-12-06 This book consists essentially of notes which were written for an Advanced Course on Classifying Spaces and Cohomology of Groups. The course took place at the Centre de Recerca Mathematica (CRM) in Bellaterra from May 27 to June 2, 1998 and was part of an emphasis semester on Algebraic Topology. It consisted of two parallel series of 6 lectures of 90 minutes each and was intended as an introduction to new homotopy theoretic methods in group cohomology. The first part of the book is concerned with methods of decomposing the classifying space of a finite group into pieces made of classifying spaces of appropriate subgroups. Such decompositions have been used with great success in the last 10-15 years in the homotopy theory of classifying spaces of compact Lie groups and p-compact groups in the sense of Dwyer and Wilkerson. For simplicity the emphasis here is on finite groups and on homological properties of various decompositions known as centralizer resp. normalizer resp. subgroup decomposition. A unified treatment of the various decompositions is given and the relations between them are explored. This is preceeded by a detailed discussion of basic notions such as classifying spaces, simplicial complexes and homotopy colimits.

Algebraic Methods in Unstable Homotopy Theory Joseph Neisendorfer 2010-02-18 The most modern and thorough treatment of unstable homotopy theory available. The focus is on those methods from algebraic topology which are needed in the presentation of results, proven by Cohen, Moore, and the author, on the exponents of homotopy groups. The author introduces various aspects of unstable homotopy theory, including: homotopy groups with coefficients; localization and completion; the Hopf invariants of Hilton, James, and Toda; Samelson products; homotopy Bockstein spectral sequences; graded Lie algebras; differential homological algebra; and the exponent theorems concerning the homotopy groups of spheres and Moore spaces. This book is suitable for a course in unstable homotopy theory, following a first course in homotopy theory. It is also a valuable reference for both experts and graduate students wishing to enter the field.

Stable Homotopy Groups of Spheres Stanley O. Kochman 2006-11-14 A central problem in algebraic topology is the calculation of the values of the stable homotopy groups of spheres +*S. In this book, a new method for this is developed based upon the analysis of the Atiyah-Hirzebruch spectral sequence. After the tools for this analysis are developed, these methods are applied to compute inductively the first 64 stable stems, a substantial improvement over the previously known 45. Much of this computation is algorithmic and is done by computer. As an application, an element of degree 62 of Kervaire invariant one is shown to have order two. This book will be useful to algebraic topologists and graduate students with a knowledge of basic homotopy theory and Brown-Peterson homology; for its methods, as a reference on the structure of the first 64 stable stems and for the tables depicting the behavior of the Atiyah-Hirzebruch and classical Adams spectral sequences through degree 64.

Fixed Points and Topological Degree in Nonlinear Analysis Jane Cronin 1995-01-05 The topological methods based on fixed-point theory and on local topological degree which have been developed by Leray, Schauder, Nirenberg, Cesari and others for the study of nonlinear differential equations are here described in detail, beginning with elementary considerations. The reader is not assumed to have any knowledge of topology beyond the theory of point sets in Euclidean n-space which ordinarily forms part of a course in advanced calculus. The methods are first developed for Euclidean n-space and applied to the study of existence and stability of periodic and almost-periodic solutions of systems of ordinary differential equations, both quasi-linear and with ``large'' nonlinearities. Then, after being extended to infinite-dimensional ``function-spaces'', these methods are applied to integral equations, partial differential equations and further problems concerning periodic solutions of ordinary differential equations.

Topological Methods for Ordinary Differential Equations Centro internazionale matematico estivo. Session 1993

Topological Fixed Point Theory of Multivalued Mappings Lech Górniewicz 2006-06-03 This book is devoted to the topological fixed point theory of multivalued mappings including applications to differential inclusions and mathematical economy. It is the first monograph dealing with the fixed point theory of multivalued mappings in metric ANR spaces. Although the theoretical material was tendentiously selected with respect to applications, the text is self-contained. Current results are presented.

Homotopy Methods in Topological Fixed and Periodic Points Theory Jerzy Jezierski 2006-01-17 The notion of a ?xed point plays a crucial role in numerous branches of mat- maticsand its applications. Informationabout the existence of such pointsis often the crucial argument in solving a problem. In particular, topological methods of ?xed point theory have been an increasing focus of interest over the last century. These topological methods of ?xed point theory are divided, roughly speaking, into two types. The ?rst type includes such as the Banach Contraction Principle where the assumptions on the space can be very mild but a small change of the map can remove the ?xed point. The second type, on the other hand, such as the Brouwer and Lefschetz Fixed Point Theorems, give the existence of a ?xed point not only for a given map but also for any its deformations. This book is an exposition of a part of the topological ?xed and periodic point theory, of this second type, based on the notions of Lefschetz and Nielsen numbers. Since both notions are homotopyinvariants, the deformationis used as an essential method, and the assertions of theorems typically state the existence of ?xed or periodic points for every map of the whole homotopy class, we refer to them as homotopy methods of the topological ?xed and periodic point theory.

Introduction to Homotopy Theory Aneta Hajek 2015-08 Homotopy theory, which is the main part of algebraic topology, studies topological objects up to homotopy equivalence. Homotopy equivalence is weaker relations than topological equivalence, i.e., homotopy classes of spaces are larger than homeomorphism classes. Even though the ultimate goal of topology is to classify various classes of topological spaces up to a homeomorphism, in algebraic topology, homotopy equivalence plays a more important role than homeomorphism, essentially because the basic tools of algebraic topology (homology and homotopy groups) are invariant with respect to homotopy equivalence, and do not distinguish topologically nonequivalent, but homotopic objects. The idea of homotopy can be turned into a formal category of category theory. The homotopy category is the category whose objects are topological spaces, and whose morphisms are homotopy equivalence classes of continuous maps. Two topological spaces X and Y are isomorphic in this category if and only if they are homotopy-equivalent. Then a functor on the category of topological spaces is homotopy invariant if it can be expressed as a functor on the homotopy category. Based on the concept of the homotopy, computation methods for algebraic and differential equations have been developed. The methods for algebraic equations include the homotopy continuation method and the continuation method. The methods for differential equations include the homotopy analysis method. In practice, there are technical difficulties in using homotopies with certain spaces. Algebraic topologists work with compactly generated spaces, CW complexes, or spectra. This book deals with homotopy theory, one of the main branches of algebraic topology.

Convex Integration Theory David Spring 2012-12-06 §1. Historical Remarks Convex Integration theory, first introduced by M. Gromov [17], is one of three general methods in immersion-theoretic topology for solving a broad range of problems in geometry and topology. The other methods are: (i) Removal of Singularities, introduced by M. Gromov and Y. Eliashberg [8]; (ii) the covering homotopy method which, following M. Gromov's thesis [16], is also referred to as the method of sheaves. The covering homotopy method is due originally to S. Smale [36] who proved a crucial covering homotopy result in order to solve the classification problem for immersions of spheres in Euclidean space. These general methods are not linearly related in the sense that succes sive methods subsumed the previous methods. Each method has its own distinct foundation, based on an independent geometrical or analytical insight. Conse quently, each method has a range of applications to problems in topology that are best suited to its particular insight. For example, a distinguishing feature of Convex Integration theory is that it applies to solve closed relations in jet spaces, including certain general classes of underdetermined non-linear systems of par tial differential equations. As a case of interest, the Nash-Kuiper Cl-isometrie immersion theorem ean be reformulated and proved using Convex Integration theory (cf. Gromov [18]). No such results on closed relations in jet spaees can be proved by means of the other two methods.

Algebraic and Geometrical Methods in Topology Louis F. McAuley 1975 In this rap version of the traditional fairy tale, the overworked younger sister gets to go to a basketball game and meets a star player, Prince Charming.

Topology II D.B. Fuchs 2003-10-27 Two top experts in topology, O.Ya. Viro and D.B. Fuchs, give an up-to-date account of research in central areas of topology and the theory of Lie groups. They cover homotopy, homology and cohomology as well as the theory of manifolds, Lie groups, Grassmanians and low-dimensional manifolds. Their book will be used by graduate students and researchers in mathematics and mathematical physics.
Algebraic Methods Unstable Homotopy 2010 The most modern and thorough treatment of unstable homotopy theory available. The focus is on those methods from algebraic topology which are needed in the presentation of results, proven by Cohen, Moore, and the author, on the exponents of homotopy groups. The author introduces various aspects of unstable homotopy theory, including: homotopy groups with coefficients; localization and completion; the Hopf invariants of Hilton, James, and Toda; Samelson products; homotopy Bockstein spectral sequences; graded Lie algebras; differential homological algebra; and the exponent theorems concerning the homotopy groups of spheres and Moore spaces. This book is suitable for a course in unstable homotopy theory, following a first course in homotopy theory. It is also a valuable reference for both experts and graduate students wishing to enter the field.
Homotopy Theory of Schemes Fabien Morel 2006 In this text, the author presents a general framework for applying the standard methods from homotopy theory to the category of smooth schemes over a reasonable base scheme k. He defines the homotopy category $h(\mathcal{E} k)$ of smooth k-schemes and shows that it plays the same role for smooth k-schemes as the classical homotopy category plays for differentiable varieties. It is shown that certain expected properties are satisfied, for example, concerning the algebraic$K$-theory of those schemes. In this way, advanced methods of algebraic topology become available in modern algebraic geometry.
Metrical Almost Periodicity and Applications to Integro-Differential Equations Marko Kostić 2023-06-06
Algebraic Topology of Finite Topological Spaces and Applications Jonathan A. Barmak 2011-08-24 This volume deals with the theory of finite topological spaces and its relationship with the homotopy and simple homotopy theory of polyhedra. The interaction between their intrinsic combinatorial and topological structures makes finite spaces a useful tool for studying problems in Topology, Algebra and Geometry from a new perspective. In particular, the methods developed in this manuscript are used to study Quillen's conjecture on the poset of p-subgroups of a finite group and the Andrews-Curtis conjecture on the 3-deformability of contractible two-dimensional complexes. This self-contained work constitutes the first detailed exposition on the algebraic topology of finite spaces. It is intended for topologists and combinatorialists, but it is also recommended for advanced undergraduate students and graduate students with a modest knowledge of Algebraic Topology.
Homotopy Methods and Global Convergence B. Curtis Eaves 1983-03 Good,No Highlights,No Markup,all pages are intact, Slight Shelfwear,may have the corners slightly dented, may have slight color changes/slightly damaged spine.
Simplicial Homotopy Theory Paul G. Goerss 2012-12-06 Since the beginning of the modern era of algebraic topology, simplicial methods have been used systematically and effectively for both computation and basic theory. With the development of Quillen's concept of a closed model category and, in particular, a simplicial model category, this collection of methods has become the primary way to describe non-abelian homological algebra and to address homotopy-theoretical issues in a variety of fields, including algebraic K-theory. This book supplies a modern exposition of these ideas, emphasizing model category theoretical techniques. Discussed here are the homotopy theory of simplicial sets, and other basic topics such as simplicial groups, Postnikov towers, and bisimplicial sets. The more advanced material includes homotopy limits and colimits, localization with respect to a map and with respect to a homology theory, cosimplicial spaces, and homotopy coherence. Interspersed throughout are many results and ideas well-known to experts, but uncollected in the literature. Intended for second-year graduate students and beyond, this book introduces many of the basic tools of modern homotopy theory. An extensive background in topology is not assumed.
Fixed Point Theory for Decomposable Sets Andrzej Fryszkowski 2006-02-21 Decomposable sets since T. R. Rockafellar in 1968 are one of basic notions in nonlinear analysis, especially in the theory of multifunctions. A subset K of measurable functions is called decomposable if (Q) for all and measurable A. This book attempts to show the present stage of "decomposable analysis" from the point of view of fixed point theory. The book is split into three parts, beginning with the background of functional analysis, proceeding to the theory of multifunctions and lastly, the decomposability property. Mathematicians and students working in functional, convex and nonlinear analysis, differential inclusions and optimal control should find this book of interest. A good background in fixed point theory is assumed as is a background in topology.
Topological Methods in Euclidean Spaces Gregory L. Naber 2012-08-29 Extensive development of such topics as elementary combinatorial techniques, Sperner's Lemma, the Brouwer Fixed Point Theorem, and the Stone-Weierstrass Theorem. New section of solutions to selected problems.
Topological Fixed Point Principles for Boundary Value Problems J. Andres 2013-04-17 The book is devoted to the topological fixed point theory both for single-valued and multivalued mappings in locally convex spaces, including its application to boundary value problems for ordinary differential equations (inclusions) and to (multivalued) dynamical systems. It is the first monograph dealing with the topological fixed point theory in non-metric spaces. Although the theoretical material was tendentiously selected with respect to applications, the text is self-contained. Therefore, three appendices concerning almost-periodic and derivo-periodic single-valued (multivalued) functions and (multivalued) fractals are supplied to the main three chapters.
Parametrized Homotopy Theory J. Peter May 2006 This book develops rigorous foundations for parametrized homotopy theory, which is the algebraic topology of spaces and spectra that are continuously parametrized by the points of a base space. It also begins the systematic study of parametrized homology and cohomology theories. The parametrized world provides the natural home for many classical notions and results, such as orientation theory, the Thom isomorphism, Atiyah and Poincare duality, transfer maps, the Adams and Wirthmuller isomorphisms, and the Serre and Eilenberg-Moore spectral sequences. But in addition to providing a clearer conceptual outlook on these classical notions, it also provides powerful methods to study new phenomena, such as twisted K-theory, and to make new constructions, such as iterated Thom spectra. Duality theory in the parametrized setting is particularly illuminating and comes in two flavors. One allows the construction and analysis of transfer maps, and a quite different one relates parametrized homology to parametrized cohomology. The latter is based formally on a new theory of duality in symmetric bicategories that is of considerable independent interest. The text brings together many recent developments in homotopy theory. It provides a highly structured theory of parametrized spectra, and it extends parametrized homotopy theory to the equivariant setting. The theory of topological model categories is given a more thorough treatment than is available in the literature. This is used, together with an interesting blend of classical methods, to resolve basic foundational problems that have no nonparametrized counterparts.
Fixed Point Theory Andrzej Granas 2013-03-09 The theory of Fixed Points is one of the most powerful tools of modern mathematics. This book contains a clear, detailed and well-organized presentation of the major results, together with an entertaining set of historical notes and an extensive bibliography describing further developments and applications. From the reviews: "I recommend this excellent volume on fixed point theory to anyone interested in this core subject of nonlinear analysis." --MATHEMATICAL REVIEWS
The Computation of Fixed Points and Applications M. J. Todd 2013-03-09 Fixed-point algorithms have diverse applications in economics, optimization, game theory and the numerical solution of boundary-value problems. Since Scarf's pioneering work [56,57] on obtaining approximate fixed points of continuous mappings, a great deal of research has been done in extending the applicability and improving the efficiency of fixed-point methods. Much of this work is available only in research papers, although Scarf's book [58] gives a remarkably clear exposition of the power of fixed-point methods. However, the algorithms described by Scarf have been super~eded by the more sophisticated restart and homotopy techniques of Merrill [~8,~9] and Eaves and Saigal [1~,16]. To understand the more efficient algorithms one must become familiar with the notions of triangulation and simplicial approxi- tion, whereas Scarf stresses the concept of primitive set. These notes are intended to introduce to a wider audience the most recent fixed-point methods and their applications. Our approach is therefore via triangu- tions. For this reason, Scarf is cited less in this manuscript than his contri- tions would otherwise warrant. We have also confined our treatment of applications to the computation of economic equilibria and the solution of optimization

problems. Hansen and Koopmans [28] apply fixed-point methods to the computation of an invariant optimal capital stock in an economic growth model. Applications to game theory are discussed in Scarf [56,58], Shapley [59], and Garcia, Lemke and Luethi [24]. Allgower [1] and Jeppson [31] use fixed-point algorithms to find many solutions to boundary-value problems.

Topological Fixed Point Theory and Applications Boju Jiang 2006-11-14 This selection of papers from the Beijing conference gives a cross-section of the current trends in the field of fixed point theory as seen by topologists and analysts. Apart from one survey article, they are all original research articles, on topics including equivariant theory, extensions of Nielsen theory, periodic orbits of discrete and continuous dynamical systems, and new invariants and techniques in topological approaches to analytic problems.

Homotopy of Operads and Grothendieck-Teichmuller Groups Benoit Fresse 2017-05-22 The ultimate goal of this book is to explain that the Grothendieck–Teichmüller group, as defined by Drinfeld in quantum group theory, has a topological interpretation as a group of homotopy automorphisms associated to the little 2-disc operad. To establish this result, the applications of methods of algebraic topology to operads must be developed. This volume is devoted primarily to this subject, with the main objective of developing a rational homotopy theory for operads. The book starts with a comprehensive review of the general theory of model categories and of general methods of homotopy theory. The definition of the Sullivan model for the rational homotopy of spaces is revisited, and the definition of models for the rational homotopy of operads is then explained. The applications of spectral sequence methods to compute homotopy automorphism spaces associated to operads are also explained. This approach is used to get a topological interpretation of the Grothendieck–Teichmüller group in the case of the little 2-disc operad. This volume is intended for graduate students and researchers interested in the applications of homotopy theory methods in operad theory. It is accessible to readers with a minimal background in classical algebraic topology and operad theory.

Syzygies and Homotopy Theory F.E.A. Johnson 2011-11-17 The most important invariant of a topological space is its fundamental group. When this is trivial, the resulting homotopy theory is well researched and familiar. In the general case, however, homotopy theory over nontrivial fundamental groups is much more problematic and far less well understood. Syzygies and Homotopy Theory explores the problem of nonsimply connected homotopy in the first nontrivial cases and presents, for the first time, a systematic rehabilitation of Hilbert's method of syzygies in the context of non-simply connected homotopy theory. The first part of the book is theoretical, formulated to allow a general finitely presented group as a fundamental group. The innovation here is to regard syzygies as stable modules rather than minimal modules. Inevitably this forces a reconsideration of the problems of noncancellation; these are confronted in the second, practical, part of the book. In particular, the second part of the book considers how the theory works out in detail for the specific examples Fn´F where Fn is a free group of rank n and F is finite. Another innovation is to parametrize the first syzygy in terms of the more familiar class of stably free modules. Furthermore, detailed description of these stably free modules is effected by a suitable modification of the method of Milnor squares. The theory developed within this book has potential applications in various branches of algebra, including homological algebra, ring theory and K-theory. Syzygies and Homotopy Theory will be of interest to researchers and also to graduate students with a background in algebra and algebraic topology.

Topological Methods for Ordinary Differential Equations Patrick Fitzpatrick 2006-11-14 The volume contains the texts of four courses, given by the authors at a summer school that sought to present the state of the art in the growing field of topological methods in the theory of o.d.e. (in finite and infinitedimension), and to provide a forum for discussion of the wide variety of mathematical tools which are involved. The topics covered range from the extensions of the Lefschetz fixed point and the fixed point index on ANR's, to the theory of parity of one-parameter families of Fredholm operators, and from the theory of coincidence degree for mappings on Banach spaces to homotopy methods for continuation principles. CONTENTS: P. Fitzpatrick: The parity as an invariant for detecting bifurcation of the zeroes of one parameter families of nonlinear Fredholm maps.- M. Martelli: Continuation principles and boundary value problems.- J. Mawhin: Topological degree and boundary value problems for nonlinear differential equations.- R.D. Nussbaum: The fixed point index and fixed point theorems.

Topological Methods in Group Theory Ross Geoghegan 2007-12-17 This book is about the interplay between algebraic topology and the theory of infinite discrete groups. It is a hugely important contribution to the field of topological and geometric group theory, and is bound to become a standard reference in the field. To keep the length reasonable and the focus clear, the author assumes the reader knows or can easily learn the necessary algebra, but wants to see the topology done in detail. The central subject of the book is the theory of ends. Here the author adopts a new algebraic approach which is geometric in spirit.

Homotopy Theory 1959-01-01 Homotopy Theory

Handbook of Topological Fixed Point Theory Robert F. Brown 2005-12-05 This book is the first in the world literature presenting all new trends in topological fixed point theory. Until now all books connected to the topological fixed point theory were devoted only to some parts of this theory. This book will be especially useful for post-graduate students and researchers interested in the fixed point theory, particularly in topological methods in nonlinear analysis, differential equations and dynamical systems. The content is also likely to stimulate the interest of mathematical economists, population dynamics experts as well as theoretical physicists exploring the topological dynamics.

Homotopy Methods In Topological Fixed

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