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[Introduction to Smooth Manifolds](#) **Differentiable Manifolds An Introduction to Differential Manifolds** *Introduction to Topological Manifolds* [Analysis and Algebra on Differentiable Manifolds: A Workbook for Students and Teachers](#) **An Introduction to Manifolds Analysis On Manifolds An Introduction To Differential Manifolds** *Foundations of Differentiable Manifolds and Lie Groups* **Riemannian Manifolds Problems and Solutions in Differential Geometry, Lie Series, Differential Forms, Relativity and Applications** [Analysis and Algebra on Differentiable Manifolds: A Workbook for Students and Teachers](#) [An Introduction to Differentiable Manifolds and Riemannian Geometry, Revised](#) **Elementary Topics in Differential Geometry** *Foundations of Differentiable Manifolds and Lie Groups* **Differential Geometry of Curves and Surfaces** [An Introductory Course on Differentiable Manifolds](#) **Numerical Solution of Stochastic Differential Equations** **Methods for Constructing Exact Solutions of Partial Differential Equations Applied Differential Geometry** *Calculus on Manifolds* **Manifolds and Differential Geometry** **Differential-algebraic Equations** **Smooth Manifolds** **International Symposium on Nonlinear Differential Equations and Nonlinear Mechanics** *Differentiable Manifolds* **Stable Solutions of Elliptic Partial Differential Equations** [Problems and Solutions in Mathematics](#) **Handbook of Topological Fixed Point Theory** *Problems and Solutions in Mathematics* **Differential Geometry: Partial Differential Equations on Manifolds** **An Introduction to Differential Manifolds** *Differential Manifolds* **The Numerical Solution of Differential-Algebraic Systems by Runge-Kutta Methods** **Exact Solutions and Invariant Subspaces of Nonlinear Partial Differential Equations in Mechanics and Physics** [Delay Differential Equations](#) *Continuous and Discrete Dynamics near Manifolds of Equilibria* **Numerical Solution of Initial-Value Problems in Differential-Algebraic Equations** [The William Lowell Putnam Mathematical Competition 1985-2000: Problems, Solutions, and Commentary](#) [Spectral Problems Associated with Corner Singularities of Solutions to Elliptic Equations](#)

Stable Solutions of Elliptic Partial Differential Equations Aug 07 2020 Stable solutions are ubiquitous in differential equations. They represent meaningful solutions from a physical point of view and appear in many applications, including mathematical physics (combustion, phase transition theory) and geometry (minimal surfaces). Stable Solutions of Elliptic Partial Differential Equations offers a self-contained presentation of the notion of stability in elliptic partial differential equations (PDEs). The central questions of regularity and classification of stable solutions are treated at length. Specialists will find a summary of the most recent developments of the theory, such as nonlocal and higher-order equations. For beginners, the book walks you through the fine versions of the maximum principle, the standard regularity theory for linear elliptic equations, and the fundamental functional inequalities commonly used in this field. The text also includes two additional topics: the inverse-square potential and some background material on submanifolds of Euclidean space.

Manifolds and Differential Geometry Jan 12 2021 Differential geometry began as the study of curves and surfaces using the methods of calculus. In time, the notions of curve and surface were generalized along with associated notions such as length, volume, and curvature. At the same time the topic has become closely allied with developments in topology. The basic object is a smooth manifold, to which some extra structure has been attached, such as a Riemannian metric, a symplectic form, a distinguished group of symmetries, or a connection on the tangent bundle. This book is a graduate-level introduction to the tools and structures of modern differential geometry. Included are the topics usually found in a course on differentiable manifolds, such as vector bundles, tensors, differential forms, de Rham cohomology, the Frobenius theorem and basic Lie group theory. The book also contains material on the general theory of connections on vector bundles and an in-depth chapter on semi-Riemannian geometry that covers basic material about Riemannian manifolds and Lorentz manifolds. An unusual feature of the book is the inclusion of an early chapter on the differential geometry of hyper-surfaces in Euclidean space. There is also a section that derives the exterior calculus version of Maxwell's equations. The first chapters of the book are suitable for a one-semester course on manifolds. There is more than enough material for a year-long course on manifolds and geometry.

[Differential Geometry of Curves and Surfaces](#) Jul 18 2021 One of the most widely used texts in its field, this volume's clear, well-written exposition is enhanced by many examples and exercises, some with hints and answers. 1976 edition.

[The William Lowell Putnam Mathematical Competition 1985-2000: Problems, Solutions, and Commentary](#) Jul 26 2019 This third volume of problems from the William Lowell Putnam Competition is unlike the previous two in that it places the problems in the context of important mathematical themes. The authors highlight connections to other problems, to the curriculum and to more advanced topics. The best problems

contain kernels of sophisticated ideas related to important current research, and yet the problems are accessible to undergraduates. The solutions have been compiled from the American Mathematical Monthly, Mathematics Magazine and past competitors. Multiple solutions enhance the understanding of the audience, explaining techniques that have relevance to more than the problem at hand. In addition, the book contains suggestions for further reading, a hint to each problem, separate from the full solution and background information about the competition. The book will appeal to students, teachers, professors and indeed anyone interested in problem solving as a gateway to a deep understanding of mathematics.

Numerical Solution of Stochastic Differential Equations May 16 2021 The numerical analysis of stochastic differential equations (SDEs) differs significantly from that of ordinary differential equations. This book provides an easily accessible introduction to SDEs, their applications and the numerical methods to solve such equations. From the reviews: "The authors draw upon their own research and experiences in obviously many disciplines... considerable time has obviously been spent writing this in the simplest language possible." --ZAMP

Problems and Solutions in Mathematics May 04 2020 This book contains a selection of more than 500 mathematical problems and their solutions from the PhD qualifying examination papers of more than ten famous American universities. The mathematical problems cover six aspects of graduate school mathematics: Algebra, Topology, Differential Geometry, Real Analysis, Complex Analysis and Partial Differential Equations. While the depth of knowledge involved is not beyond the contents of the textbooks for graduate students, discovering the solution of the problems requires a deep understanding of the mathematical principles plus skilled techniques. For students, this book is a valuable complement to textbooks. Whereas for lecturers teaching graduate school mathematics, it is a helpful reference.

Continuous and Discrete Dynamics near Manifolds of Equilibria Sep 27 2019 Entfesseln Sie die Kreativität Ihres Kindes mit über 35 einzigartigen Seite zum Färben! Sie werden viele beliebte Dinosaurier-Typen hier zu finden. Dieses Buch ist eine erstaunliche Aktivität, um die Phantasie und Kreativität Ihres Kindes zu stimulieren. Dieses tolle Buch wird Ihrem Kind auch den Namen einiger Dinosaurier beibringen, während Sie Spaß beim Färben haben. Ein perfektes Geschenk für Dinosaurier-Fans! Jede Ausmalseite ist auf einer separaten Seite gedruckt, um ein Durchbluten zu vermeiden. Geeignet für Marker, Buntstifte, Wasserfarbe, Gelstifte. Große Größe - 8,5 x 11 Zoll

Elementary Topics in Differential Geometry Sep 19 2021 In the past decade there has been a significant change in the freshman/ sophomore mathematics curriculum as taught at many, if not most, of our colleges. This has been brought about by the introduction of linear algebra into the curriculum at the sophomore level. The advantages of using linear algebra both in the teaching of differential equations and in the teaching of multivariate calculus are by now widely recognized. Several textbooks adopting this point of view are now available and have been widely adopted. Students completing the sophomore year now

have a fair preliminary understanding of spaces of many dimensions. It should be apparent that courses on the junior level should draw upon and reinforce the concepts and skills learned during the previous year. Unfortunately, in differential geometry at least, this is usually not the case. Textbooks directed to students at this level generally restrict attention to 2-dimensional surfaces in 3-space rather than to surfaces of arbitrary dimension. Although most of the recent books do use linear algebra, it is only the algebra of ~ 3 . The student's preliminary understanding of higher dimensions is not cultivated.

Differentiable Manifolds Sep 07 2020 This book is based on the full year Ph.D. qualifying course on differentiable manifolds, global calculus, differential geometry, and related topics, given by the author at Washington University several times over a twenty year period. It is addressed primarily to second year graduate students and well prepared first year students. Presupposed is a good grounding in general topology and modern algebra, especially linear algebra and the analogous theory of modules over a commutative, unitary ring. Although billed as a "first course", the book is not intended to be an overly sketchy introduction. Mastery of this material should prepare the student for advanced topics courses and seminars in differential topology and geometry. There are certain basic themes of which the reader should be aware. The first concerns the role of differentiation as a process of linear approximation of nonlinear problems. The well understood methods of linear algebra are then applied to the resulting linear problem and, where possible, the results are reinterpreted in terms of the original nonlinear problem. The process of solving differential equations (i. e., integration) is the reverse of differentiation. It reassembles an infinite array of linear approximations, resulting from differentiation, into the original nonlinear data. This is the principal tool for the reinterpretation of the linear algebra results referred to above.

Numerical Solution of Initial-Value Problems in Differential-Algebraic Equations Aug 26 2019 This book describes some of the places where differential-algebraic equations (DAE's) occur.

Problems and Solutions in Differential Geometry, Lie Series, Differential Forms, Relativity and Applications Dec 23 2021 This volume presents a collection of problems and solutions in differential geometry with applications. Both introductory and advanced topics are introduced in an easy-to-digest manner, with the materials of the volume being self-contained. In particular, curves, surfaces, Riemannian and pseudo-Riemannian manifolds, Hodge duality operator, vector fields and Lie series, differential forms, matrix-valued differential forms, Maurer-Cartan form, and the Lie derivative are covered. Readers will find useful applications to special and general relativity, Yang-Mills theory, hydrodynamics and field theory. Besides the solved problems, each chapter contains stimulating supplementary problems and software implementations are also included. The volume will not only benefit students in mathematics, applied mathematics and theoretical physics, but also researchers in the field of differential geometry. Request Inspection Copy

Handbook of Topological Fixed Point Theory Jun 04 2020 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.

An Introduction To Differential Manifolds Mar 26 2022 This invaluable book, based on the many years of teaching experience of both authors, introduces the reader to the basic ideas in differential topology. Among the topics covered are smooth manifolds and maps, the structure of the tangent bundle and its associates, the calculation of real cohomology groups using differential forms (de Rham theory), and applications such as the Poincaré-Hopf theorem relating the Euler number of a manifold and the index of a vector field. Each chapter contains exercises of varying difficulty for which solutions are provided. Special features include examples drawn from geometric manifolds in dimension 3 and Brieskorn varieties in dimensions 5 and 7, as well as detailed calculations for the cohomology groups of spheres and tori.

Smooth Manifolds Nov 09 2020 This book offers an introduction to the theory of smooth manifolds, helping students to familiarize themselves with the tools they will need for mathematical research on smooth manifolds and differential geometry. The book primarily focuses on topics concerning differential

manifolds, tangent spaces, multivariable differential calculus, topological properties of smooth manifolds, embedded submanifolds, Sard's theorem and Whitney embedding theorem. It is clearly structured, amply illustrated and includes solved examples for all concepts discussed. Several difficult theorems have been broken into many lemmas and notes (equivalent to sub-lemmas) to enhance the readability of the book. Further, once a concept has been introduced, it reoccurs throughout the book to ensure comprehension. Rank theorem, a vital aspect of smooth manifolds theory, occurs in many manifestations, including rank theorem for Euclidean space and global rank theorem. Though primarily intended for graduate students of mathematics, the book will also prove useful for researchers. The prerequisites for this text have intentionally been kept to a minimum so that undergraduate students can also benefit from it. It is a cherished conviction that "mathematical proofs are the core of all mathematical joy," a standpoint this book vividly reflects.

Introduction to Smooth Manifolds Nov 02 2022 Author has written several excellent Springer books.; This book is a sequel to Introduction to Topological Manifolds; Careful and illuminating explanations, excellent diagrams and exemplary motivation; Includes short preliminary sections before each section explaining what is ahead and why

Foundations of Differentiable Manifolds and Lie Groups Aug 19 2021 Foundations of Differentiable Manifolds and Lie Groups gives a clear, detailed, and careful development of the basic facts on manifold theory and Lie Groups. Coverage includes differentiable manifolds, tensors and differentiable forms, Lie groups and homogeneous spaces, and integration on manifolds. The book also provides a proof of the de Rham theorem via sheaf cohomology theory and develops the local theory of elliptic operators culminating in a proof of the Hodge theorem.

Analysis and Algebra on Differentiable Manifolds: A Workbook for Students and Teachers Nov 21 2021 A famous Swiss professor gave a student's course in Basel on Riemann surfaces. After a couple of lectures, a student asked him, "Professor, you have as yet not given an exact definition of a Riemann surface." The professor answered, "With Riemann surfaces, the main thing is to UNDERSTAND them, not to define them." The student's objection was reasonable. From a formal viewpoint, it is of course necessary to start as soon as possible with strict definitions, but the professor's answer also has a substantial background. The pure definition of a Riemann surface— as a complex 1-dimensional complex analytic manifold—contributes little to a true understanding. It takes a long time to really be familiar with what a Riemann surface is. This example is typical for the objects of global analysis—manifolds with structures. There are complex concrete definitions but these do not automatically explain what they really are, what we can do with them, which operations they really admit, how rigid they are. Hence, there arises the natural question—how to attain a deeper understanding? One well-known way to gain an understanding is through underpinning the definitions, theorems and constructions with hierarchies of examples, counterexamples and exercises. Their choice, construction and logical order is for any teacher in global analysis an interesting, important and fun creating task.

Introduction to Topological Manifolds Jul 30 2022 Manifolds play an important role in topology, geometry, complex analysis, algebra, and classical mechanics. Learning manifolds differs from most other introductory mathematics in that the subject matter is often completely unfamiliar. This introduction guides readers by explaining the roles manifolds play in diverse branches of mathematics and physics. The book begins with the basics of general topology and gently moves to manifolds, the fundamental group, and covering spaces.

Exact Solutions and Invariant Subspaces of Nonlinear Partial Differential Equations in Mechanics and Physics Nov 29 2019 Exact Solutions and Invariant Subspaces of Nonlinear Partial Differential Equations in Mechanics and Physics is the first book to provide a systematic construction of exact solutions via linear invariant subspaces for nonlinear differential operators. Acting as a guide to nonlinear evolution equations and models from physics and mechanics, the book focuses on the existence of new exact solutions on linear invariant subspaces for nonlinear operators and their crucial new properties. This practical reference deals with various partial differential equations (PDEs) and models that exhibit some common nonlinear invariant features. It begins with classical as well as more recent examples of solutions on invariant subspaces. In the remainder of the book, the authors develop several techniques for

constructing exact solutions of various nonlinear PDEs, including reaction-diffusion and gas dynamics models, thin-film and Kuramoto-Sivashinsky equations, nonlinear dispersion (compacton) equations, KdV-type and Harry Dym models, quasilinear magma equations, and Green-Naghdi equations. Using exact solutions, they describe the evolution properties of blow-up or extinction phenomena, finite interface propagation, and the oscillatory, changing sign behavior of weak solutions near interfaces for nonlinear PDEs of various types and orders. The techniques surveyed in Exact Solutions and Invariant Subspaces of Nonlinear Partial Differential Equations in Mechanics and Physics serve as a preliminary introduction to the general theory of nonlinear evolution PDEs of different orders and types.

International Symposium on Nonlinear Differential Equations and Nonlinear Mechanics Oct 09 2020 Nonlinear Differential Equations and Nonlinear Mechanics provides information pertinent to nonlinear differential equations, nonlinear mechanics, control theory, and other related topics. This book discusses the properties of solutions of equations in standard form in the infinite time interval. Organized into 49 chapters, this book starts with an overview of the characteristic types of differential equation systems with small parameters. This text then explains the structurally stable fields on a differentiable two manifold are the ones that exhibit the simplest features. Other chapters explore the canonic system of hyperbolic partial differential equations with fixed characteristics. This book discusses as well the monofrequent oscillations that are predominantly near one or the other of the linear modes of motion. The final chapter deals with the existence and asymptotic character of solutions of the nonlinear boundary value problem. This book is a valuable resource for pure and applied mathematicians. Aircraft engineers will also find this book useful.

Analysis On Manifolds Apr 26 2022 A readable introduction to the subject of calculus on arbitrary surfaces or manifolds. Accessible to readers with knowledge of basic calculus and linear algebra. Sections include series of problems to reinforce concepts.

An Introduction to Differential Manifolds Aug 31 2022 This book is an introduction to differential manifolds. It gives solid preliminaries for more advanced topics: Riemannian manifolds, differential topology, Lie theory. It presupposes little background: the reader is only expected to master basic differential calculus, and a little point-set topology. The book covers the main topics of differential geometry: manifolds, tangent space, vector fields, differential forms, Lie groups, and a few more sophisticated topics such as de Rham cohomology, degree theory and the Gauss-Bonnet theorem for surfaces. Its ambition is to give solid foundations. In particular, the introduction of "abstract" notions such as manifolds or differential forms is motivated via questions and examples from mathematics or theoretical physics. More than 150 exercises, some of them easy and classical, some others more sophisticated, will help the beginner as well as the more expert reader. Solutions are provided for most of them. The book should be of interest to various readers: undergraduate and graduate students for a first contact to differential manifolds, mathematicians from other fields and physicists who wish to acquire some feeling about this beautiful theory. The original French text Introduction aux variétés différentielles has been a best-seller in its category in France for many years. Jacques Lafontaine was successively assistant Professor at Paris Diderot University and Professor at the University of Montpellier, where he is presently emeritus. His main research interests are Riemannian and pseudo-Riemannian geometry, including some aspects of mathematical relativity. Besides his personal research articles, he was involved in several textbooks and research monographs.

An Introduction to Differential Manifolds Mar 02 2020 This invaluable book, based on the many years of teaching experience of both authors, introduces the reader to the basic ideas in differential topology. Among the topics covered are smooth manifolds and maps, the structure of the tangent bundle and its associates, the calculation of real cohomology groups using differential forms (de Rham theory), and applications such as the Poincaré-Hopf theorem relating the Euler number of a manifold and the index of a vector field. Each chapter contains exercises of varying difficulty for which solutions are provided. Special features include examples drawn from geometric manifolds in dimension 3 and Brieskorn varieties in dimensions 5 and 7, as well as detailed calculations for the cohomology groups of spheres and tori. Readership: Upper level undergraduates, beginning graduate students, and lecturers in geometry and topology.

Differentiable Manifolds Oct 01 2022 This textbook delves into the theory behind differentiable manifolds while exploring various physics applications along the way. Included throughout the book are a collection of exercises of varying degrees of difficulty. Differentiable Manifolds is intended for graduate students and researchers interested in a theoretical physics approach to the subject. Prerequisites include multivariable calculus, linear algebra, and differential equations and a basic knowledge of analytical mechanics.

Analysis and Algebra on Differentiable Manifolds: A Workbook for Students and Teachers Jun 28 2022 A famous Swiss professor gave a student's course in Basel on Riemann surfaces. After a couple of lectures, a student asked him, "Professor, you have as yet not given an exact definition of a Riemann surface." The professor answered, "With Riemann surfaces, the main thing is to UNDERSTAND them, not to define them." The student's objection was reasonable. From a formal viewpoint, it is of course necessary to start as soon as possible with strict definitions, but the professor's answer also has a substantial background. The pure definition of a Riemann surface— as a complex 1-dimensional complex analytic manifold—contributes little to a true understanding. It takes a long time to really be familiar with what a Riemann surface is. This example is typical for the objects of global analysis—manifolds with structures. There are complex concrete definitions but these do not automatically explain what they really are, what we can do with them, which operations they really admit, how rigid they are. Hence, there arises the natural question—how to attain a deeper understanding? One well-known way to gain an understanding is through underpinning the definitions, theorems and constructions with hierarchies of examples, counterexamples and exercises. Their choice, construction and logical order is for any teacher in global analysis an interesting, important and fun creating task.

An Introduction to Manifolds May 28 2022 Manifolds, the higher-dimensional analogs of smooth curves and surfaces, are fundamental objects in modern mathematics. Combining aspects of algebra, topology, and analysis, manifolds have also been applied to classical mechanics, general relativity, and quantum field theory. In this streamlined introduction to the subject, the theory of manifolds is presented with the aim of helping the reader achieve a rapid mastery of the essential topics. By the end of the book the reader should be able to compute, at least for simple spaces, one of the most basic topological invariants of a manifold, its de Rham cohomology. Along the way, the reader acquires the knowledge and skills necessary for further study of geometry and topology. The requisite point-set topology is included in an appendix of twenty pages; other appendices review facts from real analysis and linear algebra. Hints and solutions are provided to many of the exercises and problems. This work may be used as the text for a one-semester graduate or advanced undergraduate course, as well as by students engaged in self-study. Requiring only minimal undergraduate prerequisites, 'Introduction to Manifolds' is also an excellent foundation for Springer's GTM 82, 'Differential Forms in Algebraic Topology'.

Differential Geometry: Partial Differential Equations on Manifolds Apr 02 2020 The first of three parts comprising Volume 54, the proceedings of the Summer Research Institute on Differential Geometry, held at the University of California, Los Angeles, July 1990 (ISBN for the set is 0-8218-1493-1). Part 1 begins with a problem list by S.T. Yau, successor to his 1980 list (Sem *Foundations of Differentiable Manifolds and Lie Groups* Feb 22 2022 Foundations of Differentiable Manifolds and Lie Groups gives a clear, detailed, and careful development of the basic facts on manifold theory and Lie Groups. It includes differentiable manifolds, tensors and differentiable forms. Lie groups and homogenous spaces, integration on manifolds, and in addition provides a proof of the de Rham theorem via sheaf cohomology theory, and develops the local theory of elliptic operators culminating in a proof of the Hodge theorem. Those interested in any of the diverse areas of mathematics requiring the notion of a differentiable manifold will find this beginning graduate-level text extremely useful.

An Introductory Course on Differentiable Manifolds Jun 16 2021 Based on author Siavash Shahshahani's extensive teaching experience, this volume presents a thorough, rigorous course on the theory of differentiable manifolds. Geared toward advanced undergraduates and graduate students in mathematics, the treatment's prerequisites include a strong background in undergraduate mathematics, including multivariable calculus, linear algebra, elementary abstract algebra, and point set topology. More than 200 exercises offer students ample opportunity to gauge their skills and gain additional insights. The four-part

treatment begins with a single chapter devoted to the tensor algebra of linear spaces and their mappings. Part II brings in neighboring points to explore integrating vector fields, Lie bracket, exterior derivative, and Lie derivative. Part III, involving manifolds and vector bundles, develops the main body of the course. The final chapter provides a glimpse into geometric structures by introducing connections on the tangent bundle as a tool to implant the second derivative and the derivative of vector fields on the base manifold. Relevant historical and philosophical asides enhance the mathematical text, and helpful Appendixes offer supplementary material.

Applied Differential Geometry Mar 14 2021 This is a self-contained introductory textbook on the calculus of differential forms and modern differential geometry. The intended audience is physicists, so the author emphasises applications and geometrical reasoning in order to give results and concepts a precise but intuitive meaning without getting bogged down in analysis. The large number of diagrams helps elucidate the fundamental ideas. Mathematical topics covered include differentiable manifolds, differential forms and twisted forms, the Hodge star operator, exterior differential systems and symplectic geometry. All of the mathematics is motivated and illustrated by useful physical examples.

Methods for Constructing Exact Solutions of Partial Differential Equations Apr 14 2021 Differential equations, especially nonlinear, present the most effective way for describing complex physical processes. Methods for constructing exact solutions of differential equations play an important role in applied mathematics and mechanics. This book aims to provide scientists, engineers and students with an easy-to-follow, but comprehensive, description of the methods for constructing exact solutions of differential equations.

Differential-algebraic Equations Dec 11 2020 This is the first comprehensive textbook that provides a systematic and detailed analysis of initial and boundary value problems for differential-algebraic equations. The analysis is developed from the theory of linear constant coefficient systems via linear variable coefficient systems to general nonlinear systems. Further sections on control problems, generalized inverses of differential algebraic operators, generalized solutions, and differential equations on manifolds complement the theoretical treatment of initial value problems.

Problems and Solutions in Mathematics Jul 06 2020 This book contains a selection of more than 500 mathematical problems and their solutions from the PhD qualifying examination papers of more than ten famous American universities. The mathematical problems cover six aspects of graduate school mathematics: Algebra, Topology, Differential Geometry, Real Analysis, Complex Analysis and Partial Differential Equations. While the depth of knowledge involved is not beyond the contents of the textbooks for graduate students, discovering the solution of the problems requires a deep understanding of the mathematical principles plus skilled techniques. For students, this book is a valuable complement to textbooks. Whereas for lecturers teaching graduate school mathematics, it is a helpful reference.

Spectral Problems Associated with Corner Singularities of Solutions to Elliptic Equations Jun 24 2019 This book focuses on the analysis of eigenvalues and eigenfunctions that describe singularities of solutions to elliptic boundary value problems in domains with corners and edges. The authors treat both classical problems of mathematical physics and general elliptic boundary value problems. The volume is divided into two parts: the first is devoted to the power-logarithmic singularities of solutions to classical boundary value problems of mathematical physics. The second deals with similar singularities for higher order elliptic equations and systems. Chapter 1 collects basic facts concerning operator pencils acting in a pair of Hilbert spaces. Related properties of ordinary differential equations with constant operator coefficients are discussed and connections with the theory of general elliptic boundary value problems in domains with conic vertices are outlined. New results are presented. Chapter 2 treats the Laplace operator as a starting point and a model for the subsequent study of angular and conic singularities of solutions. Chapter 3 considers the Dirichlet boundary condition beginning with the plane case and turning to the space problems. Chapter 4 investigates some mixed boundary conditions. The Stokes system is discussed in

Chapters 5 and 6, and Chapter 7 concludes with the Dirichlet problem for the polyharmonic operator. Chapter 8 studies the Dirichlet problem for general elliptic differential equations of order $2m$ in an angle. In Chapter 9, an asymptotic formula for the distribution of eigenvalues of operator pencils corresponding to general elliptic boundary value problems in an angle is obtained. Chapters 10 and 11 discuss the Dirichlet problem for elliptic systems of differential equations of order 2 in an n -dimensional cone. Chapter 12 studies the Neumann problem for general elliptic systems, in particular with eigenvalues of the corresponding operator pencil in the strip $\{\Re \lambda - m + 1/2n \mid \Im \lambda \leq 1/2\}$. It is shown that only integer numbers contained in this strip are eigenvalues. Applications are placed within chapter introductions and as special sections at the end of chapters. Prerequisites include standard PDE and functional analysis courses.

Riemannian Manifolds Jan 24 2022 This text focuses on developing an intimate acquaintance with the geometric meaning of curvature and thereby introduces and demonstrates all the main technical tools needed for a more advanced course on Riemannian manifolds. It covers proving the four most fundamental theorems relating curvature and topology: the Gauss-Bonnet Theorem, the Cartan-Hadamard Theorem, Bonnet's Theorem, and a special case of the Cartan-Ambrose-Hicks Theorem.

Delay Differential Equations Oct 28 2019 Delay Differential Equations: Recent Advances and New Directions cohesively presents contributions from leading experts on the theory and applications of functional and delay differential equations (DDEs). Students and researchers will benefit from a unique focus on theory, symbolic, and numerical methods, which illustrate how the concepts described can be applied to practical systems ranging from automotive engines to remote control over the Internet. Comprehensive coverage of recent advances, analytical contributions, computational techniques, and illustrative examples of the application of current results drawn from biology, physics, mechanics, and control theory. Students, engineers and researchers from various scientific fields will find Delay Differential Equations: Recent Advances and New Directions a valuable reference.

An Introduction to Differentiable Manifolds and Riemannian Geometry, Revised Oct 21 2021 The second edition of An Introduction to Differentiable Manifolds and Riemannian Geometry, Revised has sold over 6,000 copies since publication in 1986 and this revision will make it even more useful. This is the only book available that is approachable by "beginners" in this subject. It has become an essential introduction to the subject for mathematics students, engineers, physicists, and economists who need to learn how to apply these vital methods. It is also the only book that thoroughly reviews certain areas of advanced calculus that are necessary to understand the subject. Line and surface integrals Divergence and curl of vector fields

The Numerical Solution of Differential-Algebraic Systems by Runge-Kutta Methods Dec 31 2019 The term differential-algebraic equation was coined to comprise differential equations with constraints (differential equations on manifolds) and singular implicit differential equations. Such problems arise in a variety of applications, e.g. constrained mechanical systems, fluid dynamics, chemical reaction kinetics, simulation of electrical networks, and control engineering. From a more theoretical viewpoint, the study of differential-algebraic problems gives insight into the behaviour of numerical methods for stiff ordinary differential equations. These lecture notes provide a self-contained and comprehensive treatment of the numerical solution of differential-algebraic systems using Runge-Kutta methods, and also extrapolation methods. Readers are expected to have a background in the numerical treatment of ordinary differential equations. The subject is treated in its various aspects ranging from the theory through the analysis to implementation and applications.

Calculus on Manifolds Feb 10 2021 This book uses elementary versions of modern methods found in sophisticated mathematics to discuss portions of "advanced calculus" in which the subtlety of the concepts and methods makes rigor difficult to attain at an elementary level.

Differential Manifolds Jan 30 2020 Introductory text for advanced undergraduates and graduate students presents systematic study of the topological structure of smooth manifolds, starting with elements of theory and concluding with method of surgery. 1993 edition.