Ricci Calculus An Introduction To Tensor Analysis And Its Geometrical Applications Grundlehren Der Mathematischen Wissenschaften

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Matrix Calculus, Kronecker Product And Tensor Product: A Practical Approach To Linear Algebra, Multilinear Algebra And Tensor Calculus With Software Implementations (Third Edition) - Hardy Yorick 2019-04-08

Our self-contained volume provides an accessible introduction to linear and multilinear algebra as well as tensor calculus. Besides the standard techniques for linear algebra, multilinear algebra and tensor calculus, many advanced topics are included where emphasis is placed on the Kronecker product and tensor product. The Kronecker product has widespread applications in signal processing, discrete wavelets, statistical physics, Hopf algebra, Yang-Baxter relations, computer graphics, fractals, quantum mechanics, quantum computing, entanglement, teleportation and partial trace. All these fields are covered comprehensively.The volume contains many detailed worked-out examples. Each chapter includes useful exercises and supplementary problems. In the last chapter, software implementations are provided for different concepts. The volume is well suited for pure and applied mathematicians as well as theoretical physicists and engineers.New topics added to the third edition are: mutually unbiased bases, Cayley transform, spectral theorem, nonnormal matrices, Gâteaux derivatives and matrices, trace and partial trace, spin coherent states, Clebsch-Gordan series, entanglement, hyperdeterminant, tensor eigenvalue problem, Carleman matrix and Bell matrix, tensor fields and Ricci tensors, and software implementations.

A First Course in General Relativity - Bernard Schutz 2009-05-14

Second edition of a widely-used textbook providing the first step into general relativity for undergraduate students with minimal mathematical background.

Tensor Algebra and Tensor Analysis for Engineers - Mikhail Itskov 2009-04-30

There is a large gap between engineering courses in tensor algebra on one hand, and the treatment of linear transformations within classical linear algebra on the other. This book addresses primarily engineering students with some initial knowledge of matrix algebra. Thereby, mathematical formalism is applied as far as it is absolutely necessary. Numerous exercises provided in the book are accompanied by solutions enabling autonomous study. The last chapters deal with modern developments in the theory of isotropic and anisotropic tensor functions and their applications to continuum mechanics and might therefore be of high interest for PhD-students and scientists working in this area.

Ricci-Calculus - Jan Arnoldus Schouten 1954

This is an entirely new book. The first edition appeared in 1923 and at that time it was up to date. But in 193 5 and 1938 the author and Prof. D. J. STRUIK published a new book, their Einführung I and li, and this book not only gave the first systematic introduction to the kernel index method but also contained many notions that had come into prominence since 1923. For instance densities, quantities of the second kind, pseudo-quantities, normal Coordinates, the symbolism of exterior forms, the LIE derivative, the theory of variation and deformation and the theory of subprojective connexions were included. Now since 1938 there have been many new developments and so a book on RICCI cal culus and its applications has to cover quite different ground from the book of 1923. Though the purpose remains to make the reader acquainted with RICCI's famous instrument in its modern form, the book must have quite a different methodical structure and quite different applica tions have to be chosen. The first chapter contains algebraical preliminaries but the whole text is modernized and there is a section on hybrid quantities (quantities with indices of the first and of the second kind) and one on the many abridged notations that have been developed by several authors. In the second chapter the most important analytical notions that come before the introduction of a connexion aredealt with in full.

From Algebraic Structures to Tensors - Gérard Favier 2020-01-02

Nowadays, tensors play a central role for the representation, mining, analysis, and fusion of multidimensional, multimodal, and heterogeneous big data in numerous fields. This set on Matrices and Tensors in Signal Processing aims at giving a self-contained and comprehensive presentation of various concepts and methods, starting from fundamental algebraic structures to advanced tensor-based applications, including recently developed tensor models and efficient algorithms for dimensionality reduction and parameter estimation. Although its title suggests an orientation towards signal processing, the results presented in this set will also be of use to readers interested in other disciplines. This first book provides an introduction to matrices and tensors of higher-order based on the structures of vector space and tensor space. Some standard algebraic structures are first described, with a focus on the hilbertian approach for signal representation, and function approximation based on Fourier series and orthogonal polynomial series. Matrices and hypermatrices associated with linear, bilinear and multilinear maps are more particularly studied. Some basic results are presented for block matrices. The notions of decomposition, rank, eigenvalue, singular value, and unfolding of a tensor are introduced, by emphasizing similarities and differences between matrices and tensors of higher-order.

Exterior Analysis - Erdogan Suhubi 2013-09-13

Exterior analysis uses differential forms (a mathematical technique) to analyze curves, surfaces, and structures. Exterior Analysis is a first-of-its-kind resource that uses applications of differential forms, offering a mathematical approach to solve problems in defining a precise measurement to ensure structural integrity. The book provides methods to study different types of equations and offers detailed explanations of fundamental theories and techniques to obtain concrete solutions to determine symmetry. It is a useful tool for structural, mechanical and electrical engineers, as well as physicists and mathematicians. Provides a thorough explanation of how to apply differential equations to solve real-world engineering problems Helps researchers in mathematics, science, and engineering develop skills needed to implement mathematical techniques in their research Includes physical applications and methods used to solve practical problems to determine symmetry

Introduction to Tensor Calculus, Relativity and Cosmology - D. F. Lawden 2002-01-01

Elementary introduction pays special attention to aspects of tensor calculus and relativity that students find most difficult. Contents include tensors in curved spaces and application to general relativity theory; black holes; gravitational waves; application of general relativity principles to cosmology. Numerous exercises. Solution guide available upon request. 1982 edition.

Tensors, Relativity, and Cosmology - Mirjana Dalarsson 2015-07-08

Tensors, Relativity, and Cosmology, Second Edition, combines relativity, astrophysics, and cosmology in a single volume, providing a simplified introduction to each subject that is followed by detailed mathematical derivations. The book includes a section on general relativity that gives the case for a curved space-time, presents the mathematical background (tensor calculus, Riemannian geometry), discusses the Einstein equation and its solutions (including black holes and Penrose processes), and considers the energy-momentum tensor for various solutions. In addition, a section on relativistic astrophysics discusses stellar contraction and collapse, neutron stars and their equations of state, black holes, and accretion onto collapsed objects, with a final section on cosmology discussing cosmological models, observational tests, and scenarios for the early universe. This fully revised and updated second edition includes new material on relativistic effects, such as the behavior of clocks and measuring rods in motion, relativistic addition of velocities, and the twin paradox, as well as new material on gravitational waves, amongst other topics. Clearly combines relativity, astrophysics, and cosmology in a single volume Extensive introductions to each section are followed by relevant examples and numerous exercises Presents topics of interest to those researching and studying tensor calculus, the theory of relativity, gravitation, cosmology, quantum cosmology, Robertson-Walker Metrics, curvature tensors, kinematics, black holes, and more Fully revised and updated with 80 pages of new material on relativistic effects, such as relativity of simultaneity and relativity of the concept of distance, amongst other topics Provides an easy-to-understand approach to this advanced field of mathematics and modern physics by providing highly detailed derivations of all equations and results

Manifolds, Tensors and Forms - Paul Renteln 2014

Comprehensive treatment of the essentials of modern differential geometry and topology for graduate students in mathematics and the physical sciences.

Ricci-Calculus - Jan Arnoldus Schouten 2013-06-29

This is an entirely new book. The first edition appeared in 1923 and at that time it was up to date. But in 193 5 and 1938 the author and Prof. D. J. STRUIK published a new book, their Einführung I and li, and this book not only gave the first systematic introduction to the kernel index method but also contained many notions that had come into prominence since 1923. For instance densities, quantities of the second kind, pseudo-quantities, normal Coordinates, the symbolism of exterior forms, the LIE derivative, the theory of variation and deformation and the theory of subprojective connexions were included. Now since 1938 there have been many new developments and so a book on RICCI cal culus and its applications has to cover quite different ground from the book of 1923. Though the purpose remains to make the reader acquainted with RICCI's famous instrument in its modern form, the book must have quite a different methodical structure and quite different applica tions have to be chosen. The first chapter contains algebraical preliminaries but the whole text is modernized and there is a section on hybrid quantities (quantities with indices of the first and of the second kind) and one on the many abridged notations that have been developed by several authors. In the second chapter the most important analytical notions that come before the introduction of a connexion aredealt with in full.

TEXTBOOK OF TENSOR CALCULUS AND DIFFERENTIAL GEOMETRY AND THEIR APPLICATIONS - Quddus Khan 2020-12-29

This book is intended to serve as a Textbook for Undergraduate and Post - graduate students of Mathematics. It will be useful to the researchers working in the field of Differential geometry and its applications to general theory of relativity and other applied areas. It will also be helpful in preparing for the competitive examinations like IAS, IES, NET, PCS, and UP Higher Education exams. The text starts with a chapter on Preliminaries discussing basic concepts and results which would be taken for general later in the subsequent chapters of this book. This is followed by the Study of the Tensors Algebra and its operations and types, Christoffel's symbols and its properties, the concept of covariant differentiation and its properties, Riemann's symbols and its properties, and application of tensor in different areas in part – I and the study of the Theory of Curves in Space, Concepts of a Surface and Fundamental forms, Envelopes and Developables, Curvature of Surface and Lines of Curvature, Fundamental Equations of Surface Theory, Theory of Geodesics, Differentiable Manifolds and Riemannian Manifold and Application of Differential Geometry in Part –II. KEY FEATURES: Provides basic Concepts in an easy to understand style; Presentation of the subject in a natural way; Includes a large number of solved examples and illuminating illustrations; Exercise questions at the end of the topic and at the end of each chapter; Proof of the theorems are given in an easy to understand style; Neat and clean figures are given at appropriate places; Notes and remarks are given at appropriate places.

Tensor Methods in Statistics - Peter McCullagh 2018-07-18

A pioneering monograph on tensor methods applied to distributional problems arising in statistics, this work begins with the study of multivariate moments and cumulants. An invaluable reference for graduate students and professional statisticians. 1987 edition.

Curvature of Space and Time, with an Introduction to Geometric Analysis - Iva Stavrov 2020-11-12

This book introduces advanced undergraduates to Riemannian geometry and mathematical general relativity. The overall strategy of the book is to explain the concept of curvature via the Jacobi equation which, through discussion of tidal forces, further helps motivate the Einstein field equations. After addressing concepts in geometry such as metrics, covariant differentiation, tensor calculus and curvature, the book explains the mathematical framework for both special and general relativity. Relativistic concepts discussed include (initial value formulation of) the Einstein equations, stress-energy tensor, Schwarzschild space-time, ADM mass and geodesic incompleteness. The concluding chapters of the book introduce the reader to geometric analysis: original results of the author and her undergraduate student collaborators illustrate how methods of analysis and differential equations are used in addressing questions from geometry and relativity. The book is mostly self-contained and the reader is only expected to have a solid foundation in multivariable and vector calculus and linear algebra. The material in this book was first developed for the 2013 summer program in geometric analysis at the Park City Math Institute, and was recently modified and expanded to reflect the author's experience of teaching mathematical general relativity to advanced undergraduates at Lewis & Clark College.

Tensor Analysis with Applications - Zafar Ahsan 2008

The principal aim of tensor analysis is to investigate the relations which remain valid when we change from one coordinate system to another. Albert Einstein found it to be an excellent tool for the presentation of his general theory of relativity and consequently tensor analysis came to prominence in mathematics. It has applications in most branches of theoretical physics and engineering. This present book is intended as a text for postgraduate students of mathematics, physics and engineering. It is self-contained and requires prior knowledge of elementary calculus, differential equations and classical mechanics. It consists of five chapters, each containing a large number of solved examples, unsolved problems and links to the solution of these problems. "Tensor Analysis with Applications" can be used on a selection of university courses, and will be a welcome addition to the library of maths, physics and engineering departments.

An Introduction to Riemannian Geometry and the Tensor Calculus - C. E. Weatherburn 2008-12-04

The purpose of this book is to bridge the gap between differential geometry of Euclidean space of three dimensions and the more advanced work on differential geometry of generalised space. The subject is treated with the aid of the Tensor Calculus, which is associated with the names of Ricci and Levi-Civita; and the book provides an introduction both to this calculus and to Riemannian geometry. The geometry of subspaces has been considerably simplified by use of the generalized covariant differentiation introduced by Mayer in 1930, and successfully applied by other mathematicians.

Tensor Analysis and Nonlinear Tensor Functions - Yuriy I. Dimitrienko 2002-11-30

Tensor Analysis and Nonlinear Tensor Functions embraces the basic fields of tensor calculus: tensor algebra, tensor analysis, tensor description of curves and surfaces, tensor integral calculus, the basis of tensor calculus in Riemannian spaces and affinely connected spaces, - which are used in mechanics and electrodynamics of continua, crystallophysics, quantum chemistry etc. The book suggests a new approach to definition of a tensor in space R3, which allows us to show a geometric representation of a tensor and operations on tensors. Based on this approach, the author gives a mathematically rigorous definition of a tensor as an individual object in arbitrary linear, Riemannian and other spaces for the first time. It is the first book to present a systematized theory of tensor invariants, a theory of nonlinear anisotropic tensor functions and a theory of indifferent tensors describing the physical properties of continua. The book will be useful for students and postgraduates of mathematical, mechanical engineering and physical departments

of universities and also for investigators and academic scientists working in continuum mechanics, solid physics, general relativity, crystallophysics, quantum chemistry of solids and material science.

Tensor Calculus for Physics - Dwight E. Neuenschwander 2015

It is an ideal companion for courses such as mathematical methods of physics, classical mechanics, electricity and magnetism, and relativity.--Gary White, editor of The Physics Teacher "American Journal of Physics"

Elements of General Relativity - Piotr T. Chruściel 2020-03-19

This book provides an introduction to the mathematics and physics of general relativity, its basic physical concepts, its observational implications, and the new insights obtained into the nature of space-time and the structure of the universe. It introduces some of the most striking aspects of Einstein's theory of gravitation: black holes, gravitational waves, stellar models, and cosmology. It contains a self-contained introduction to tensor calculus and Riemannian geometry, using in parallel the language of modern differential geometry and the coordinate notation, more familiar to physicists. The author has strived to achieve mathematical rigour, with all notions given careful mathematical meaning, while trying to maintain the formalism to the minimum fit-for-purpose. Familiarity with special relativity is assumed. The overall aim is to convey some of the main physical and geometrical properties of Einstein's theory of gravitation, providing a solid entry point to further studies of the mathematics and physics of Einstein equations.

Drop Heating and Evaporation: Analytical Solutions in Curvilinear Coordinate Systems - Gianpietro Elvio Cossali 2020-06-30

This book describes analytical methods for modelling drop evaporation, providing the mathematical tools needed in order to generalise transport and constitutive equations and to find analytical solutions in curvilinear coordinate systems. Transport phenomena in gas mixtures are treated in considerable detail, and the basics of differential geometry are introduced in order to describe interface-related transport phenomena. One chapter is solely devoted to the description of sixteen different orthogonal curvilinear coordinate systems, reporting explicitly on the forms of their differential operators (gradient, divergent, curl, Laplacian) and transformation matrices. The book is intended to guide the reader from mathematics, to physical descriptions, and ultimately to engineering applications, in order to demonstrate the effectiveness of applied mathematics when properly adapted to the real world. Though the book primarily addresses the needs of engineering researchers, it will also benefit graduate students.

Tensors and Manifolds - Robert H. Wasserman 2004

The book sets forth the basic principles of tensors and manifolds, describing how the mathematics underlies elegant geometrical models of classical mechanics, relativity and elementary particle physics."--BOOK JACKET.

TENSORS - AHSAN, ZAFAR 2015-05-21

The principal aim of analysis of tensors is to investigate those relations which remain valid when we change from one coordinate system to another. This book on Tensors requires only a knowledge of elementary calculus, differential equations and classical mechanics as pre-requisites. It provides the readers with all the information about the tensors along with the derivation of all the tensorial relations/equations in a simple manner. The book also deals in detail with topics of importance to the study of special and general relativity and the geometry of differentiable manifolds with a crystal clear exposition. The concepts dealt within the book are well supported by a number of solved examples. A carefully selected set of unsolved problems is also given at the end of each chapter, and the answers and hints for the solution of these problems are given at the end of the book. The applications of tensors to the fields of differential geometry, relativity, cosmology and electromagnetism is another attraction of the present book. This book is intended to serve as text for postgraduate students of mathematics, physics and engineering. It is ideally suited for both students and teachers who are engaged in research in General Theory of Relativity and Differential Geometry.

Vector and Tensor Analysis with Applications - A. I. Borisenko 2012-08-28

Concise, readable text ranges from definition of vectors and discussion of algebraic operations on vectors to the concept of tensor and algebraic operations on tensors. Worked-out problems and solutions. 1968 edition.

A Most Incomprehensible Thing - Peter Collier 2017-04-01

A straightforward, enjoyable guide to the mathematics of Einstein's relativity To really understand Einstein's theory of relativity – one of the cornerstones of modern physics – you have to get to grips with the underlying mathematics. This self-study guide is aimed at the general reader who is motivated to tackle that not insignificant challenge. With a user-friendly style, clear step-by-step mathematical derivations, many fully solved problems and numerous diagrams, this book provides a comprehensive introduction to a fascinating but complex subject. For those with minimal mathematical background, the first chapter gives a crash course in foundation mathematics. The reader is then taken gently by the hand and guided through a wide range of fundamental topics, including Newtonian mechanics; the Lorentz transformations; tensor calculus; the Einstein field equations; the Schwarzschild solution (which gives a good approximation of the spacetime of our Solar System); simple black holes, relativistic cosmology and gravitational waves. Special relativity helps explain a huge range of non-gravitational physical phenomena and has some strangely counter-intuitive consequences. These include time dilation, length contraction, the relativity of simultaneity, mass-energy equivalence and an absolute speed limit. General relativity, the leading theory of gravity, is at the heart of our understanding of cosmology and black holes. "I must observe that the theory of relativity resembles a building consisting of two separate stories, the special theory and the general theory. The special theory, on which the general theory rests, applies to all physical phenomena with the exception of gravitation; the general theory provides the law of gravitation and its relations tothe other forces of nature." – Albert Einstein, 1919 Understand even the basics of Einstein's amazing theory and the world will never seem the same again. Contents: Preface Introduction 1 Foundation mathematics 2 Newtonian mechanics 3 Special relativity 4 Introducing the manifold 5 Scalars, vectors, one-forms and tensors 6 More on curvature 7 General relativity 8 The Newtonian limit 9 The Schwarzschild metric 10 Schwarzschild black holes 11 Cosmology 12 Gravitational waves Appendix: The Riemann curvature tensor Bibliography Acknowledgements January 2019. This third edition has been revised to make the material even more accessible to the enthusiastic general reader who seeks to understand the mathematics of relativity.

What Are Tensors Exactly? - Hongyu Guo 2021-06-16

Tensors have numerous applications in physics and engineering. There is often a fuzzy haze surrounding the concept of tensor that puzzles many students. The old-fashioned definition is difficult to understand because it is not rigorous; the modern definitions are difficult to understand because they are rigorous but at a cost of being more abstract and less intuitive.The goal of this book is to elucidate the concepts in an intuitive way but without loss of rigor, to help students gain deeper understanding. As a result, they will not need to recite those definitions in a parrot-like manner any more. This volume answers common questions and corrects many misconceptions about tensors. A large number of illuminating illustrations helps the reader to understand the concepts more easily.This unique reference text will benefit researchers, professionals, academics, graduate students and undergraduate students.

Introduction to Vector and Tensor Analysis - Robert C. Wrede 2013-01-30

Examines general Cartesian coordinates, the cross product, Einstein's special theory of relativity, bases in general coordinate systems, maxima and minima of functions of two variables, line integrals, integral theorems, and more. 1963 edition.

Introduction to Vectors and Tensors - Ray M. Bowen 1976-05-31

To Volume 1 This work represents our effort to present the basic concepts of vector and tensor analysis. Volume 1 begins with a brief discussion of algebraic structures followed by a rather detailed discussion of the algebra of vectors and tensors. Volume 2 begins with a discussion of Euclidean manifolds, which leads to a development of the analytical and geometrical aspects of vector and tensor fields. We have not included a discussion of general differentiable manifolds. However, we have included a chapter on vector and tensor fields defined on hypersurfaces in a Euclidean manifold. In preparing this two-volume work, our intention was to present to engineering and science students a modern introduction to vectors and tensors. Traditional courses on applied mathematics have emphasized problem-solving techniques rather than the systematic development of concepts. As a result, it is possible for such courses to become terminal mathematics courses rather than courses which equip the student to develop his or her understanding

further.

Introduction to Tensor Analysis and the Calculus of Moving Surfaces - Pavel Grinfeld 2013-09-24

This textbook is distinguished from other texts on the subject by the depth of the presentation and the discussion of the calculus of moving surfaces, which is an extension of tensor calculus to deforming manifolds. Designed for advanced undergraduate and graduate students, this text invites its audience to take a fresh look at previously learned material through the prism of tensor calculus. Once the framework is mastered, the student is introduced to new material which includes differential geometry on manifolds, shape optimization, boundary perturbation and dynamic fluid film equations. The language of tensors, originally championed by Einstein, is as fundamental as the languages of calculus and linear algebra and is one that every technical scientist ought to speak. The tensor technique, invented at the turn of the 20th century, is now considered classical. Yet, as the author shows, it remains remarkably vital and relevant. The author’s skilled lecturing capabilities are evident by the inclusion of insightful examples and a plethora of exercises. A great deal of material is devoted to the geometric fundamentals, the mechanics of change of variables, the proper use of the tensor notation and the discussion of the interplay between algebra and geometry. The early chapters have many words and few equations. The definition of a tensor comes only in Chapter 6 – when the reader is ready for it. While this text maintains a consistent level of rigor, it takes great care to avoid formalizing the subject. The last part of the textbook is devoted to the Calculus of Moving Surfaces. It is the first textbook exposition of this important technique and is one of the gems of this text. A number of exciting applications of the calculus are presented including shape optimization, boundary perturbation of boundary value problems and dynamic fluid film equations developed by the author in recent years. Furthermore, the moving surfaces framework is used to offer new derivations of classical results such as the geodesic equation and the celebrated Gauss-Bonnet theorem.

A Student's Guide to Vectors and Tensors - Daniel A. Fleisch 2011-09-22

Vectors and tensors are among the most powerful problem-solving tools available, with applications ranging from mechanics and electromagnetics to general relativity. Understanding the nature and application of vectors and tensors is critically important to students of physics and engineering. Adopting the same approach used in his highly popular A Student's Guide to Maxwell's Equations, Fleisch explains vectors and tensors in plain language. Written for undergraduate and beginning graduate students, the book provides a thorough grounding in vectors and vector calculus before transitioning through contra and covariant components to tensors and their applications. Matrices and their algebra are reviewed on the book's supporting website, which also features interactive solutions to every problem in the text where students can work through a series of hints or choose to see the entire solution at once. Audio podcasts give students the opportunity to hear important concepts in the book explained by the author.

Tensors and Their Applications - Nazrul Islam 2006-12

The Book Is Written Is In Easy-To-Read Style With Corresponding Examples. The Main Aim Of This Book Is To Precisely Explain The Fundamentals Of Tensors And Their Applications To Mechanics, Elasticity, Theory Of Relativity, Electromagnetic, Riemannian Geometry And Many Other Disciplines Of Science And Engineering, In A Lucid Manner. The Text Has Been Explained Section Wise, Every Concept Has Been Narrated In The Form Of Definition, Examples And Questions Related To The Concept Taught. The Overall Package Of The Book Is Highly Useful And Interesting For The People Associated With The Field.

The Geometry of Physics - Theodore Frankel 2011-11-03

This book provides a working knowledge of those parts of exterior differential forms, differential geometry, algebraic and differential topology, Lie groups, vector bundles and Chern forms that are essential for a deeper understanding of both classical and modern physics and engineering. Included are discussions of analytical and fluid dynamics, electromagnetism (in flat and curved space), thermodynamics, the Dirac operator and spinors, and gauge fields, including Yang–Mills, the Aharonov–Bohm effect, Berry phase and instanton winding numbers, quarks and quark model for mesons. Before discussing abstract notions of differential geometry, geometric intuition is developed through a rather extensive introduction to the study of surfaces in ordinary space. The book is ideal for graduate and advanced undergraduate students of physics, engineering or mathematics as a course text or for self study. This third edition includes an overview of Cartan's exterior differential forms, which previews many of the geometric concepts developed in the text.

Applications of Tensor Analysis - A. J. McConnell 2014-06-10

DIVTensor theory, applications to dynamics, electricity, elasticity, hydrodynamics, etc. Level is advanced undergraduate. Over 500 solved problems. /div

Tensor Calculus for Engineers and Physicists - Emil de Souza Sánchez Filho 2016-05-20

This textbook provides a rigorous approach to tensor manifolds in several aspects relevant for Engineers and Physicists working in industry or academia. With a thorough, comprehensive, and unified presentation, this book offers insights into several topics of tensor analysis, which covers all aspects of n-dimensional spaces. The main purpose of this book is to give a self-contained yet simple, correct and comprehensive mathematical explanation of tensor calculus for undergraduate and graduate students and for professionals. In addition to many worked problems, this book features a selection of examples, solved step by step. Although no emphasis is placed on special and particular problems of Engineering or Physics, the text covers the fundamentals of these fields of science. The book makes a brief introduction into the basic concept of the tensorial formalism so as to allow the reader to make a quick and easy review of the essential topics that enable having the grounds for the subsequent themes, without needing to resort to other bibliographical sources on tensors. Chapter 1 deals with Fundamental Concepts about tensors and chapter 2 is devoted to the study of covariant, absolute and contravariant derivatives. The chapters 3 and 4 are dedicated to the Integral Theorems and Differential Operators, respectively. Chapter 5 deals with Riemann Spaces, and finally the chapter 6 presents a concise study of the Parallelism of Vectors. It also shows how to solve various problems of several particular manifolds.

Tensor Calculus - J. L. Synge 2012-04-26

Fundamental introduction of absolute differential calculus and for those interested in applications of tensor calculus to mathematical physics and engineering. Topics include spaces and tensors; basic operations in Riemannian space, curvature of space, more.

Schaums Outline of Tensor Calculus - David C. Kay 2011-02-11

The ideal review for your tensor calculus course More than 40 million students have trusted Schaum’s Outlines for their expert knowledge and helpful solved problems. Written by renowned experts in their respective fields, Schaum’s Outlines cover everything from math to science, nursing to language. The main feature for all these books is the solved problems. Step-by-step, authors walk readers through coming up with solutions to exercises in their topic of choice. 300 solved problems Coverage of all course fundamentals Effective problem-solving techniques Complements or supplements the major logic textbooks Supports all the major textbooks for tensor calculus courses

Vectors, Tensors and the Basic Equations of Fluid Mechanics - Rutherford Aris 2012-08-28

Introductory text, geared toward advanced undergraduate and graduate students, applies mathematics of Cartesian and general tensors to physical field theories and demonstrates them in terms of the theory of fluid mechanics. 1962 edition.

Introduction to Tensor Calculus and Continuum Mechanics - J. H. Heinbockel 2001

This book is an introduction to tensor calculus and continuum mechanics. i.e. applied mathematics developing basic equations in engineering, physics and science.

Tensor Analysis and Its Applications - Quddus Khan 2015-08-27

This book is intended to serve as a textbook for undergraduate and postgraduate students of mathematics. It will be useful to the researchers working in the field of differential geometry and its applications to general theory of relativity and other applied areas. It will also be helpful in preparing for the competitive examinations like IAS, IES, NET, PCS, and other higher education tests. The text starts with the basic concepts and results, which shall refer throughout this book and is followed by the study of the tensor algebra and its calculus, consisting the notion of tensor, its operations, and its different types; Christoffels symbols and its properties, the concept of covariant differentiation of tensors and its properties, tensor form of gradient, divergence, laplacian and curl, divergence of a tensor, intrinsic derivatives, and parallel displacement of vectors, Riemanns symbols and its properties, and application of tensor in different areas.

An Introduction to Riemannian Geometry and the Tensor Calculus - Charles Ernest Weatherburn 1938

Tensors - Anadi Jiban Das 2007-10-05
Here is a modern introduction to the theory of tensor algebra and tensor analysis. It discusses tensor algebra and introduces differential manifold. Coverage also details tensor analysis, differential forms, connection forms, and curvature tensor. In addition, the book investigates Riemannian and pseudo-Riemannian manifolds in great detail. Throughout, examples and problems are furnished from the theory of relativity and continuum mechanics.
Introduction to Differential Geometry - Luther Pfahler Eisenhart 2015-12-08
Book 3 in the Princeton Mathematical Series. Originally published in 1950. The Princeton Legacy Library uses the latest print-on-demand technology to again make available previously out-of-print books from the distinguished backlist of Princeton University Press. These editions preserve the original texts of these important books while presenting them in durable paperback and hardcover editions. The goal of the Princeton Legacy Library is to vastly increase access to the rich scholarly heritage found in the thousands of books published by Princeton University Press since its founding in 1905.