The Absolute Differential Calculus Calculus Of Ten

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Einstein's Italian Mathematicians: Ricci, Levi-Civita, and the Birth of General Relativity Judith R. Goodstein 2018-07-20 In the first decade of the twentieth century as Albert Einstein began formulating a revolutionary theory of gravity, the Italian mathematician Gregorio Ricci was entering the later stages of what appeared to be a productive if not particularly memorable career, devoted largely to what his colleagues regarded as the dogged development of a mathematical language he called the absolute differential calculus. In 1912, the work of these two dedicated scientists would intersect—and physics and mathematics would never be the same. Einstein's Italian Mathematicians chronicles the lives and intellectual contributions of Ricci and his brilliant student Tullio Levi-Civita, including letters, interviews, memoranda, and other personal and professional papers, to tell the remarkable, little-known story of how two Italian academicians, of widely divergent backgrounds and temperaments, came to provide the indispensable mathematical foundation—today known as the tensor calculus—for general relativity.

Character Theory of Finite Groups I. Martin Isaacs 1994-01-01 "The book is a pleasure to read. There is no question but that it will become, and deserves to be, a widely used textbook and reference." — Bulletin of the American Mathematical Society. Character theory provides a powerful tool for proving theorems about finite groups. In addition to dealing with techniques for applying characters to "pure" group theory, a large part of this book is devoted to the properties of the characters themselves and how these properties reflect and are reflected in the structure of the group. Chapter I consists of ring theoretic preliminaries. Chapters 2 to 6 and 8 contain the basic material of character theory, while Chapter 7 treats an important technique for the application of characters to group theory. Chapter 9 considers irreducible representations over arbitrary fields, leading to a focus on subfields of the complex numbers in Chapter 10. In Chapter 15 the author introduces Brauer's theory of blocks and "modular characters." Remaining chapters deal with more specialized topics, such as the connections between the set of degrees of the irreducible characters and structure of a group. Following each chapter is a selection of carefully thought out problems, including exercises, examples,

further results and extensions and variations of theorems in the text. Prerequisites for this book are some basic finite group theory: the Sylow theorems, elementary properties of permutation groups and solvable and nilpotent groups. Also useful would be some familiarity with rings and Galois theory. In short, the contents of a first-year graduate algebra course should be sufficient preparation.

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.

Companion Encyclopedia of the History and Philosophy of the Mathematical Sciences Ivor Grattan-Guiness 2004-11-11 First published in 2004. Routledge is an imprint of Taylor & Francis, an informa company.

Elements of the Theory of Markov Processes and Their Applications Albert T. Bharucha-Reid 1997-01-01 Graduate-level text and reference in probability, with numerous scientific applications. Nonmeasure-theoretic introduction to theory of Markov processes and to mathematical models based on the theory. Appendixes. Bibliographies. 1960 edition.

Ettore Majorana: Unpublished Research Notes on Theoretical Physics Salvatore Esposito 2008-10-10 Without listing his works, all of which are highly notable both for the originality of the methods utilized as well as for the importance of the results achieved, we limit ourselves to the following: Inmodernnucleartheories, thecontributionmadebythisresearcher to the introduction of the forces called 'Majorana forces' is universally recognized as the one, among the most fundamental, that permits us to theoretically comprehend the reasons for nuclear stability. The work of Majorana today serves as a basis for the most important research in this ?eld. In atomic physics, the merit of having resolved some of the most - tricate questions on the structure of spectra through simple and elegant considerations of symmetry is due to Majorana. Lastly, he devised a brilliant method that permits us to treat the positive and negative electron in a symmetrical way, ?nally elimin- ing the necessity to rely on the extremely arti?cial and unsatisfactory hypothesis of an in?nitely large electrical charge di?used in space, a question that had been tackled in vain by many other scholars [4].

Subject Headings Used in the Dictionary Catalogs of the Library of Congress [from 1897 Through December 1955] Library of Congress. Subject Cataloging Division 1957

The Absolute Differential Calculus Tullio Levi Civita 1961

100 Years of Math Milestones: The Pi Mu Epsilon Centennial Collection Stephan Ramon Garcia 2019-06-13 This book is an outgrowth of a collection of 100 problems chosen to celebrate the 100th anniversary of the undergraduate math honor society Pi Mu Epsilon. Each chapter describes a problem or event, the progress made, and connections to entries from other years or other parts of mathematics. In places, some knowledge of analysis or algebra, number theory or probability will be helpful. Put together, these problems will be appealing and accessible to energetic and enthusiastic math majors and aficionados of all stripes. Stephan Ramon Garcia is WM Keck Distinguished Service Professor and professor of mathematics at Pomona College. He is the author of four books and over eighty research articles in operator

theory, complex analysis, matrix analysis, number theory, discrete geometry, and other fields. He has coauthored dozens of articles with students, including one that appeared in The Best Writing on Mathematics: 2015. He is on the editorial boards of Notices of the AMS, Proceedings of the AMS, American Mathematical Monthly, Involve, and Annals of Functional Analysis. He received four NSF research grants as principal investigator and five teaching awards from three different institutions. He is a fellow of the American Mathematical Society and was the inaugural recipient of the Society's Dolciani Prize for Excellence in Research. Steven J. Miller is professor of mathematics at Williams College and a visiting assistant professor at Carnegie Mellon University. He has published five books and over one hundred research papers, most with students, in accounting, computer science, economics, geophysics, marketing, mathematics, operations research, physics, sabermetrics, and statistics. He has served on numerous editorial boards, including the Journal of Number Theory, Notices of the AMS, and the Pi Mu Epsilon Journal. He is active in enrichment and supplemental curricular initiatives for elementary and secondary mathematics, from the Teachers as Scholars Program and VCTAL (Value of Computational Thinking Across Grade Levels), to numerous math camps (the Eureka Program, HCSSiM, the Mathematics League International Summer Program, PROMYS, and the Ross Program). He is a fellow of the American Mathematical Society, an at-large senator for Phi Beta Kappa, and a member of the Mount Greylock Regional School Committee, where he sees firsthand the challenges of applying mathematics.

Gravitation and Inertia Ignazio Ciufolini 2018-06-26 Einstein's standard and battle-tested geometric theory of gravity--spacetime tells mass how to move and mass tells spacetime how to curve--is expounded in this book by Ignazio Ciufolini and John Wheeler. They give special attention to the theory's observational checks and to two of its consequences: the predicted existence of gravitomagnetism and the origin of inertia (local inertial frames) in Einstein's general relativity: inertia here arises from mass there. The authors explain the modern understanding of the link between gravitation and inertia in Einstein's theory, from the origin of inertia in some cosmological models of the universe, to the interpretation of the initial value formulation of Einstein's standard geometrodynamics; and from the devices and the methods used to determine the local inertial frames of reference, to the experiments used to detect and measure the "dragging of inertial frames of reference." In this book, Ciufolini and Wheeler emphasize present, past, and proposed tests of gravitational interaction, metric theories, and general relativity. They describe the numerous confirmations of the foundations of geometrodynamics and some proposed experiments, including space missions, to test some of its fundamental predictions--in particular gravitomagnetic field or "dragging of inertial frames" and gravitational waves.

Companion Encyclopedia of the History and Philosophy of the Mathematical Sciences I. Grattan-Guinness 2003 Mathematics is one of the most basic -- and most ancient -- types of knowledge. Yet the details of its historical development remain obscure to all but a few specialists. The two-volume Companion Encyclopedia of the History and Philosophy of the Mathematical Sciences recovers this mathematical heritage, bringing together many of the world's leading historians of mathematics to examine the history and philosophy of the mathematical sciences in a cultural context, tracing their evolution from ancient times to the twentieth century. In 176 concise articles divided into twelve parts, contributors describe and analyze the variety of problems, theories, proofs, and techniques in all areas of pure and applied mathematics, including probability and statistics. This indispensable reference work demonstrates the continuing importance of mathematics and its use in physics, astronomy,

engineering, computer science, philosophy, and the social sciences. Also addressed is the history of higher education in mathematics. Carefully illustrated, with annotated bibliographies of sources for each article, The Companion Encyclopedia is a valuable research tool for students and teachers in all branches of mathematics. Contents of Volume 1: Â•Ancient and Non-Western Traditions Â•The Western Middle Ages and the Renaissance Â•Calculus and Mathematical Analysis Â•Functions, Series, and Methods in Analysis Â•Logic, Set Theories, and the Foundations of Mathematics Â•Algebras and Number Theory Contents of Volume 2: Â•Geometries and Topology Â•Mechanics and Mechanical Engineering Â•Physics, Mathematical Physics, and Electrical Engineering Â•Probability, Statistics, and the Social Sciences Â•Higher Education and Institutions Â•Mathematics and Culture Â•Select Bibliography, Chronology, Biographical Notes, and Index

Record University of North Carolina (1793-1962) 1922

Large Strain Finite Element Method Antonio Munjiza 2015-02-16 An introductory approach to the subject of large strains and large displacements in finite elements. Large Strain Finite Element Method: A Practical Course, takes an introductory approach to the subject of large strains and large displacements in finite elements and starts from the basic concepts of finite strain deformability, including finite rotations and finite displacements. The necessary elements of vector analysis and tensorial calculus on the lines of modern understanding of the concept of tensor will also be introduced. This book explains how tensors and vectors can be described using matrices and also introduces different stress and strain tensors. Building on these, step by step finite element techniques for both hyper and hypo-elastic approach will be considered. Material models including isotropic, unisotropic, plastic and viscoplastic materials will be independently discussed to facilitate clarity and ease of learning. Elements of transient dynamics will also be covered and key explicit and iterative solvers including the direct numerical integration, relaxation techniques and conjugate gradient method will also be explored. This book contains a large number of easy to follow illustrations, examples and source code details that facilitate both reading and understanding. Takes an introductory approach to the subject of large strains and large displacements in finite elements. No prior knowledge of the subject is required. Discusses computational methods and algorithms to tackle large strains and teaches the basic knowledge required to be able to critically gauge the results of computational models. Contains a large number of easy to follow illustrations, examples and source code details. Accompanied by a website hosting code examples.

Calculus Gilbert Strang 2017-09-14 Gilbert Strang's clear, direct style and detailed, intensive explanations make this textbook ideal as both a course companion and for self-study. Single variable and multivariable calculus are covered in depth. Key examples of the application of calculus to areas such as physics, engineering and economics are included in order to enhance students' understanding. New to the third edition is a chapter on the 'Highlights of calculus', which accompanies the popular video lectures by the author on MIT's OpenCourseWare. These can be accessed from math.mit.edu/~gs.

Marcel Grossmann Claudia Graf-Grossmann 2018-06-08 Zurich, summer 1912. Albert Einstein has just returned from Prague to the city on the Limmat. He sends a plea for help to his former fellow student, the mathematician Marcel Grossmann (1878-1936), for he is in need of assistance with the mathematical calculations of his general theory of relativity. What then follows is one of the most fascinating chapters of science history, with far-reaching

consequences for the lives of the two friends. Marcel Grossmann's granddaughter paints here a picture of a fiery and many-talented scientist and patriot. She traces the influence of an entrepreneurial family during Germany's rapid industrial expansion in the late 19th century. The family's fluctuating fortunes take the story to the vibrant city of Budapest on the Danube; they enable readers to sense the pioneering spirit at Zurich's young Polytechnic Institute (now ETH Zurich) – but also reflect the worries and hardships of the First World War and interwar years. The Foreword is written by Prof. Remo Ruffini, founder and president of the International Center for Relativistic Astrophysics and the Marcel Grossmann Meetings. Last but not least, an extensive contribution by Dr. Tilman Sauer offers a scientific-historical appreciation of Marcel Grossmann's enduring contributions.

Intellectual Mastery of Nature. Theoretical Physics from Ohm to Einstein, Volume 2
Christa Jungnickel 1990-09-24 Winner of the 1987 Pfizer Award of the History of Science Society "A majestic study of a most important spoch of intellectual history."—Brian Pippard, Times Literary Supplement "The authors' use of archival sources hitherto almost untouched gives their story a startling vividness. These volumes are among the finest works produced by historians of physics."—Jed Z. Buchwald, Isis "The authors painstakingly reconstruct the minutiae of laboratory budgets, instrument collections, and student numbers; they disentangle the intrigues of faculty appointments and the professional values those appointments reflected; they explore collegial relationships among physicists; and they document the unending campaign of scientists to wring further support for physics from often reluctant ministries."—R. Steven Turner, Science "Superbly written and exhaustively researched."—Peter Harman, Nature

Tensors and Riemannian Geometry Nail H. Ibragimov 2015-08-31 This book is based on the experience of teaching the subject by the author in Russia, France, South Africa and Sweden. The author provides students and teachers with an easy to follow textbook spanning a variety of topics on tensors, Riemannian geometry and geometric approach to partial differential equations. Application of approximate transformation groups to the equations of general relativity in the de Sitter space simplifies the subject significantly.

Foundations of Differential Geodesy Joseph Zund 2012-12-06 Differential geodesy is concerned with the geometry of the gravity field of the Earth, which is of fundamental importance to both theoretical geodesy and geophysics. This monograph presents a unified treatment of the foundations of differential geodesy as proposed originally by Antonio Marussi and Martin Hotine in their work. The principal features of the Marussi-Hotine approach to theoretical aspects are given in the first five chapters (based on leg calculus), while the last five chapters are devoted to the fundamental ideas of the Marussi and Hotine theory. The text includes practical problems and is intended for use by research geodesists, graduate students in geodesy, and theoretical geophysicists.

Library of Congress Subject Headings Library of Congress 2002

Chess for Fun & Chess for Blood Edward Lasker 1962-01-01 Chess as art and recreation; checkmating combinations, endgame play, strategic principles, more. Full details and analysis of author's famous game with Emanuel Lasker. 94 diagrams; other illustrations. "Very enjoyable." — Cleveland Chess Bulletin.

VII Hotine-Marussi Symposium on Mathematical Geodesy Nico Sneeuw 2012-02-02 The Hotine-Marussi Symposium is the core meeting of a "think thank", a group scientists in the geodetic environment working on theoretical and methodological subjects, while maintaining the foundations of geodesy to the proper level by corresponding to the strong advancements improved by technological development in the field of ICT, electronic computing, space technology, new measurement devices etc. The proceedings of the symposium cover a broad area of arguments which integrate the foundations of geodesy as a science. The common feature of the papers therefore is not on the object, but rather in the high mathematical standards with which subjects are treated.

Tensors, Differential Forms, and Variational Principles David Lovelock 2012-04-20 Incisive, self-contained account of tensor analysis and the calculus of exterior differential forms, interaction between the concept of invariance and the calculus of variations. Emphasis is on analytical techniques. Includes problems.

An Introduction to RIEMANNIAN GEOMETRY AND THE TENSOR CALCULUS

From Geometry to Topology H. Graham Flegg 2012-03-08 Introductory text for first-year math students uses intuitive approach, bridges the gap from familiar concepts of geometry to topology. Exercises and Problems. Includes 101 black-and-white illustrations. 1974 edition.

Methods of Mathematical Physics David Hilbert 1985

The Physical and Mathematical Foundations of the Theory of Relativity Antonio Romano 2019-09-25 This unique textbook offers a mathematically rigorous presentation of the theory of relativity, emphasizing the need for a critical analysis of the foundations of general relativity in order to best study the theory and its implications. The transitions from classical mechanics to special relativity and then to general relativity are explored in detail as well, helping readers to gain a more profound and nuanced understanding of the theory as a whole. After reviewing the fundamentals of differential geometry and classical mechanics, the text introduces special relativity, first using the physical approach proposed by Einstein and then via Minkowski's mathematical model. The authors then address the relativistic thermodynamics of continua and electromagnetic fields in matter – topics which are normally covered only very briefly in other treatments – in the next two chapters. The text then turns to a discussion of general relativity by means of the authors' unique critical approach, underlining the difficulty of recognizing the physical meaning of some statements, such as the physical meaning of coordinates and the derivation of physical quantities from those of space-time. Chapters in this section cover the model of space-time proposed by Schwarzschild; black holes; the Friedman equations and the different cosmological models they describe; and the Fermi-Walker derivative. Well-suited for graduate students in physics and mathematics who have a strong foundation in real analysis, classical mechanics, and general physics, this textbook is appropriate for a variety of graduate-level courses that cover topics in relativity. Additionally, it will interest physicists and other researchers who wish to further study the subtleties of these theories and understand the contemporary scholarly discussions surrounding them.

Advanced Calculus Lynn Harold Loomis 2014-02-26 An authorised reissue of the long out of print classic textbook, Advanced Calculus by the late Dr Lynn Loomis and Dr Shlomo Sternberg

both of Harvard University has been a revered but hard to find textbook for the advanced calculus course for decades. This book is based on an honors course in advanced calculus that the authors gave in the 1960's. The foundational material, presented in the unstarred sections of Chapters 1 through 11, was normally covered, but different applications of this basic material were stressed from year to year, and the book therefore contains more material than was covered in any one year. It can accordingly be used (with omissions) as a text for a year's course in advanced calculus, or as a text for a three-semester introduction to analysis. The prerequisites are a good grounding in the calculus of one variable from a mathematically rigorous point of view, together with some acquaintance with linear algebra. The reader should be familiar with limit and continuity type arguments and have a certain amount of mathematical sophistication. As possible introductory texts, we mention Differential and Integral Calculus by R Courant, Calculus by T Apostol, Calculus by M Spivak, and Pure Mathematics by G Hardy. The reader should also have some experience with partial derivatives. In overall plan the book divides roughly into a first half which develops the calculus (principally the differential calculus) in the setting of normed vector spaces, and a second half which deals with the calculus of differentiable manifolds.

Subject-index to the author-catalogue. 1908-10. 2 v Calcutta. Imperial library 1939

Differential and Integral Calculus Richard Courant 2011-08-15 The classic introduction to the fundamentals of calculus Richard Courant's classic text Differential and Integral Calculus is an essential text for those preparing for a career in physics or applied math. Volume 1 introduces the foundational concepts of "function" and "limit", and offers detailed explanations that illustrate the "why" as well as the "how". Comprehensive coverage of the basics of integrals and differentials includes their applications as well as clearly-defined techniques and essential theorems. Multiple appendices provide supplementary explanation and author notes, as well as solutions and hints for all in-text problems.

Tullio Levi-Civita 1938 Handwritten letter dated October 10, 1938 envelope Italy Tullio Levi-Civita, FRS (born 29 March 1873; died 29 December 1941) was an Italian mathematician, most famous for his work on absolute differential calculus (tensor calculus) and its applications to the theory of relativity. At the time of his correspondence with LMU, the 1938 race laws enacted by the Italian Fascist government deprived Levi-Civita of his professorship and of his membership of all scientific societies. However, that did not stop him from trying to help his friends, as proven by his recommendation letter to LMU for Dr. Beniamino Segre. Segre had also lost his professorship as a result of the anti-Jewish laws. He spent the next 8 years in Great Britain (mostly at the University of Manchester), then returned to Italy to resume his academic career. Isolated from the scientific world, Levi-Civita died in his apartment in Rome in 1941. Later on, when asked what he liked best about Italy, Einstein said spaghetti and Levi-Civita. Photos retrieved from Wikipedia 7/12/2012.

Differential Geometry and Mathematical Physics Gerd Rudolph 2017-03-22 The book is devoted to the study of the geometrical and topological structure of gauge theories. It consists of the following three building blocks:- Geometry and topology of fibre bundles,- Clifford algebras, spin structures and Dirac operators,- Gauge theory.Written in the style of a mathematical textbook, it combines a comprehensive presentation of the mathematical foundations with a discussion of a variety of advanced topics in gauge theory.The first building block includes a number of specific topics, like invariant connections, universal connections, H-

structures and the Postnikov approximation of classifying spaces.Given the great importance of Dirac operators in gauge theory, a complete proof of the Atiyah-Singer Index Theorem is presented. The gauge theory part contains the study of Yang-Mills equations (including the theory of instantons and the classical stability analysis), the discussion of various models with matter fields (including magnetic monopoles, the Seiberg-Witten model and dimensional reduction) and the investigation of the structure of the gauge orbit space. The final chapter is devoted to elements of quantum gauge theory including the discussion of the Gribov problem, anomalies and the implementation of the non-generic gauge orbit strata in the framework of Hamiltonian lattice gauge theory.The book is addressed both to physicists and mathematicians. It is intended to be accessible to students starting from a graduate level.

Principles of Inorganic Materials Design John N. Lalena 2020-05-05 Learn the fundamentals of material design with this all-inclusive approach to the basics in the field Study of material science is an important aspect of curricula at universities worldwide. This text is designed to serve students at a fundamental level, positioning material design as an essential aspect of the study of electronics, medicine, and energy storage. Now in its 3rd edition, Principles of Inorganic Material Design is an introduction to relevant topics including inorganic materials structure/property relations and material behaviors. The new edition now includes chapters on computational materials science, intermetallic compounds, and covalent compounds. The text is meant to aid students in their studies by providing additional tools to study the key concepts and understand recent developments in materials research. In addition to the many topics covered, the textbook includes: ● Accessible learning tools to help students better understand key concepts ● Updated content including case studies and new information on computational materials science ● Practical end-of-chapter exercises to assist students with the learning of the material ● A look at experimental studies and results to provide a 360 view of field materials design For undergraduates just learning the material or professionals looking to brush up on their knowledge of current material design information, this text covers a wide range of concepts, research, and topics to help round out their education.

The absolute differential calculus Tullio Levi-Civita 1926

Biographical Dictionary of Great Mathematicians G. Ramamurthy 2006

Differential Equations with Applications Paul D. Ritger 2000-01-01 Coherent, balanced introductory text focuses on initial- and boundary-value problems, general properties of linear equations, and the differences between linear and nonlinear systems. Includes large number of illustrative examples worked out in detail and extensive sets of problems. Answers or hints to most problems appear at end.

Manifolds, Tensors and Forms Paul Renteln 2013-11-21 Comprehensive treatment of the essentials of modern differential geometry and topology for graduate students in mathematics and the physical sciences.

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.

Four Faultless Felons G. K. Chesterton 1989-01-01 Four members of a London club relate their former careers in crime

Introduction to Integral Calculus Ulrich L. Rohde 2012-01-20 An accessible introduction to the fundamentals of calculusneeded to solve current problems in engineering and the physicalsciences I ntegration is an important function of calculus, andIntroduction to Integral Calculus combines fundamental conceptswith scientific problems to develop intuition and skills forsolving mathematical problems related to engineering and thephysical sciences. The authors provide a solid introduction tointegral calculus and feature applications of integration,solutions of differential equations, and evaluation methods. Withlogical organization coupled with clear, simple explanations, theauthors reinforce new concepts to progressively build skills andknowledge, and numerous real-world examples as well as intriguingapplications help readers to better understand the connectionsbetween the theory of calculus and practical problem solving. The first six chapters address the prerequisites needed tounderstand the principles of integral calculus and explore suchtopics as anti-derivatives, methods of converting integrals intostandard form, and the concept of area. Next, the authors reviewnumerous methods and applications of integral calculus,including: Mastering and applying the first and second fundamental theoremsof calculus to compute definite integrals Defining the natural logarithmic function using calculus Evaluating definite integrals Calculating plane areas bounded by curves Applying basic concepts of differential equations to solveordinary differential equations With this book as their guide, readers quickly learn to solve abroad range of current problems throughout the physical sciencesand engineering that can only be solved with calculus. Examplesthroughout provide practical guidance, and practice problems andexercises allow for further development and fine-tuning of variouscalculus skills. Introduction to Integral Calculus is an excellentbook for upper-undergraduate calculus courses and is also an idealreference for students and professionals who would like to gain afurther understanding of the use of calculus to solve problems in asimplified manner.

The Absolute Differential Calculus (Calculus of Tensors) Tullio Levi-Civita 2013-07-24 Written by a distinguished mathematician, this classic examines the mathematical material necessary for a grasp of relativity theory. Covers introductory theories, fundamental quadratic forms, absolute differential calculus, and physical applications. 1926 edition.