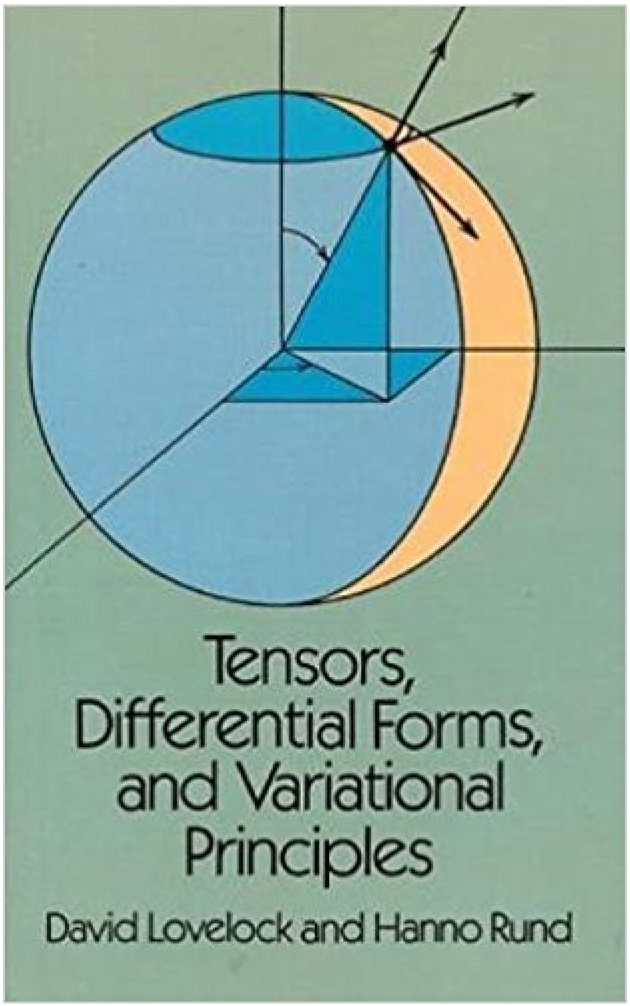
Tensors, Differential Forms, And Variational Principles (Dover Books On Mathematics)



Synopsis

The aim of this book is to present a self-contained, reasonably modern account of tensor analysis and the calculus of exterior differential forms, adapted to the needs of physicists, engineers, and applied mathematicians. In the later, increasingly sophisticated chapters, the interaction between the concept of invariance and the calculus of variations is examined. This interaction is of profound importance to all physical field theories.Beginning with simple physical examples, the theory of tensors and forms is developed by a process of successive abstractions. This enables the reader to infer generalized principles from concrete situations Ã¢â ¬â • departing from the traditional approach to tensors and forms in terms of purely differential-geometric concepts.The treatment of the calculus of variations of single and multiple integrals is based ab initio on CarathÃƒÂ©odory's method of equivalent integrals. Subsequent material explores the effects of invariance postulates on variational principles, focusing ultimately on relativistic field theories. Other discussions include:Ã¢â ¬Â¢ integral invariantsÃ¢â ¬Â¢ simple and direct derivations of Noether's theoremsÃ¢â ¬Â¢ Riemannian spaces with indefinite metricsThe emphasis in this book is on analytical techniques, with abundant problems, ranging from routine manipulative exercises to technically difficult problems encountered by those using tensor techniques in research activities. A special effort has been made to collect many useful results of a technical nature, not generally discussed in the standard literature. The Appendix, newly revised and enlarged for the Dover edition, presents a reformulation of the principal concepts of the main text within the terminology of current global differential geometry, thus bridging the gap between classical tensor analysis and the fundamentals of more recent global theories.

Book Information

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Customer Reviews

I found the complaint of 2015 about the math equations not changeable and the same problem still exists today. In addition, the font size of notes is not changeable either. It seems doesn’t think it’s important.This is an addition to my previous comment. The author could have used matrix algebra to simply many derivations. The book could be much shorter and easier to read, in my opinion.One of my pet peeves is that this book certainly lacks structure. It could go on for several tens of pages non-stop, like old fashion Fotran code. There are no boldface titles such as definition, axiom, lemma, theorem, corollary ... Readers have to figure them out in the context.

As long as you have strong differential calculus, then this book is as clear as can be (note: differential calculus should be strong before attempting to learn this anyway).It’s well written in general context. Everything is motivated and follows logically. I think the book is perfect so far.It presents the "mathematics of GR" in a very procedural manner. In a sense that it is always clear what we are trying to define, why we are doing so, and how to do it. Start by defining then requiring "orthogonal transformations" for all coordinate transformations. Define scalers, vectors, co-vectors, etc. by how they respond under these transformations. Build calculus and whatever else from these definitions. Everything else follows accordingly.Again, it’s an excellent text written with clarity. Definitely a must if looking at GR and tensor analysis for the first time (or 2nd time. Or maybe even 3rd).

This is a well composed dissertation on differential forms. Everything from tensors entities defined in Euclidean space having affine (linear) connections to non-Euclidean space having nonlinear connections. The authors initially provide simple notions for motivation w.r.t. differential forms (basically Cartesian tensors) and gradually develop into more general representations. I especially appreciate the appendix which presents the most abstract notions (purely mathematical) of differential forms.

Unfortunately, this book relies heavily on the manipulation of indices rather than on more algebraic or geometric approaches. This makes it a tedious read.

One of the best books on tensor analysis I have read. I have been trying to study tensors on my own for a couple of years and most references are very difficult to follow. I found this book extremely clear for a beginner with a fair background on calculus.

I am quite mathematically oriented and have found 'Tensor Theory' as difficult as anything I have worked at. This book provides some excellent introductions into complex concepts by beginning with areas most scientists and engineers are familiar and drawing it into curvilinear coordinates and beyond. I found this helpful to me in introducing covariant and controvariant tensors and giving at least some physical notions into this most non-physical arena.I would not recommend this to the casual mathematician but for the serious student it could be very helpfulDr. R. L. Pendleton

As a retired physicist and author, this is an excellent book for students, engineers, and physical scientists, whether you want to learn or review.

Wonderful tensor introduction. Good late undergraduate/early graduate text.

Tensors, Differential Forms, and Variational Principles (Dover Books on Mathematics) The Absolute Differential Calculus (Calculus of Tensors) (Dover Books on Mathematics) Vectors and Tensors By Example: Including Cartesian Tensors, Quaternions, and Matlab Examples Splines and Variational Methods (Dover Books on Mathematics) Cohomology and Differential Forms (Dover Books on Mathematics) Vectors, Tensors and the Basic Equations of Fluid Mechanics (Dover Books on Mathematics) Cartesian Tensors: An Introduction (Dover Books on Mathematics) Transformations Of Coordinates, Vectors, Matrices And Tensors Part I: LAGRANGEÃ¢â ¬â„¢S EQUATIONS, HAMILTONÃ¢â ¬â„¢S EQUATIONS, SPECIAL THEORY OF RELATIVITY AND CALCULUS ... Mathematics From 0 And 1 Book 16) Partial Differential Equations for Scientists and Engineers (Dover Books on Mathematics) An Introduction to Differential Equations and Their Applications (Dover Books on Mathematics) Tensor and Vector Analysis: With Applications to Differential Geometry (Dover Books on Mathematics) Partial Differential Equations of Mathematical Physics and Integral Equations (Dover Books on Mathematics) Ordinary Differential Equations (Dover Books on Mathematics) Hilbert Space Methods in Partial Differential Equations (Dover Books on Mathematics) Finite-Dimensional Variational Inequalities and Complementarity Problems (Springer Series in Operations Research and Financial Engineering) Differential Equations and Their

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