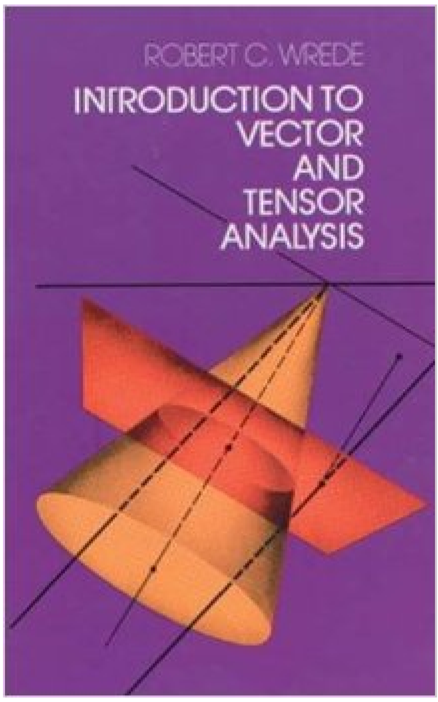
Introduction To Vector And Tensor Analysis (Dover Books On Mathematics)



Synopsis

This broad introduction to vector and tensor analysis is designed for the advanced undergraduate or graduate student in mathematics, physics, and engineering as well as for the practicing engineer or physicist who needs a theoretical understanding of these essential mathematical tools. In recent years, the vector approach has found its way even into writings on aspects of biology, economics, and other sciences.The many and various topics covered include: the algebra of vectors â ” linear dependence and independence, transformation equations, the inner product, the cross product, and the algebra of matrixes; the differentiation of vectors â ” geometry of space curves, kinematics, moving frames of reference, Newtonian orbits and special relativity theory; partial differentiation of vectors â ” geometry of space curves, kinematics, moving frames of reference, Newtonian orbits and special relativity theory; partial differentiation and associated concepts â ” surface representations, bases in general coordinate systems, and maxima and minima of functions of two variables; the integration of vectors â ” line integrals, surface integrals, surface tensors and volume integrals; tensor algebra and analysis â ” fundamental notions of Â n-space, transformations and tensors, Riemannian geometry, tensor processes of differentiation, geodesics, the curvature tensor and its algebraic properties, and general relativity theory.Throughout, Professor Wrede stresses the interrelationships between algebra and geometry, and moves frequently from one to the other. As he points out, vector and tensor analysis provides a kind of bridge between elementary aspects of linear algebra, geometry and analysis. He uses the classical notation for vector analysis, but introduces a more appropriate new notation for tensors, which he correlates with the common vector notation. He stresses proofs and concludes each section with a set of problems designed to help the student get a solid grasp of the ideas, and explore them more thoroughly on his own. His approach features a combination of important historical material with up-to-date developments in both fields. The knowledge of vector and tensor analysis gained in this way is excellent preparation for further studies in differential geometry, applied mathematics, and theoretical physics.

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Customer Reviews

In order to facilitate the judgement of my review I will introduce myself. I am a retired professor of physiology with a background in medical physics. Since I have always wanted to grasp the relativity theory of Einstein, but did not have the necessary background in vector and tensor analysis, I am now studying in this area to fulfill my dream. I have tried several books on this subject and found Robert C Wrede's book to be the best. I have found his explanations rigorous and clear. No confusing errors as a matter of fact no errors. The reason for looking up this title on the internet again is that I enjoyed this title so much that I would like to order an additional copy with hard cover. One of the positive aspect of this title are the well chosen examples and exercises with always correct answers of the odd numbered ones in the back. An additional plus is that the author provides short historical background throughout the text.

This non-descript chestnut from Dover books is actually a good amateur's 'alibaba' entry to Tensor Analysis, with a short exposition of General Relavity at the end. Don't be put off by Experts, one reviewer suggests Spivak on Differential Manifolds. Please! sneak into the subject armed with a sharp pencil, a sheaf of paper, and write out the tensors sans the summation convention. Tensors look humungous, and Christoffel tensors _are_ humungous, but the subject will yield to a few weeks of concentrated scratchpad figuring. The book actually requires the basics of vector analysis, a la the stuff in most electro-mag texts. From there you can take a flying leap into this neverneverland where there were supposed to be only twelve people who understood the subject. Not actually that bad. The grand finale shows us the grand spacetime metric, which looks a bit like ye olde Pythagorean Theorem all over again, this time in grand style. Fun book to rummage through. Save Spivak and differential geometry for dessert.

I first encountered this book when I was 14 and trying to learn vectors and tensors to study relativity.

That was, I am sorry to say, nearly 30 years ago... I liked the book then as a thoroughly grounded compilation of definitions and theorems that told the story. This is how I learned to use vectors and tensors. I also own Spivak (all 5 volumes) and I can tell you that approaching those first would be be very confusing without the nuts-and-bolts component methods from Wrede. No matter how elegant you get with differential forms or manifold notation; when it comes time to use a tensor you have to break it down into components; and no other book is as good as this one.

I think this book is beyond a simple introduction. First half of the book is Vector Analysis and other half is mixture of transformations and Tensor analysis. It covers a lot and has examples for each concept. What I did not like was that the concepts were introduced from general to particular. So if you are not exposed to Vector or Tensor analysis, it is not easy to follow a new concept defined on n-dimensional space and see application on two dimensional space.So it was a good refresher with some applications to Physics but for new starter it is difficult especially for self lerner. Also definitions were very abstract, dry without any meaning attached to it. I can not considered this book as a course book by itself.

A very good book. The exercises are well thought out, and require a little critical thinking (unlike modern text books). I used this book as additional reference material for my matrix theory class. The best element of this book is that applications in physics are utilized in almost every chapter. Do not be thrown off by the notation used in the book. Yes, the author's notation can be confusing, but he uses it in order to get the student familiar with tensor notation. As an engineering student, it is beneficial to be familiar with different notations in mathematics, and this book will add to any student's mathematical syntax.

This is a fine intro to vector and tensor analysis -- when Fred Flintstone lived and dinosaurs walked the earth. The modern approach is to use the language and results of differential forms and to consider "geometric objects" living on manifolds, whose components transform in certain ways under coordinate changes. In contrast, the prehistoric method is to define things to be contravariant vectors, covariant vectors (really 1-forms in today's language) and metric tensors if their components transform in certain ways. This is the the kind of tensor analysis Einstein learnt. This is the style you will find in Adler, Bazin, and Schiffer's book on general relativity. Given modern perspectives and tools, this is exactly the way not to learn it today. I bought a copy merely to contrast this antiquated approach with the modern ones that's been in vogue since the time of Elie

Cartan. If you want a modern text, try Janich’s "Vector Analysis."

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