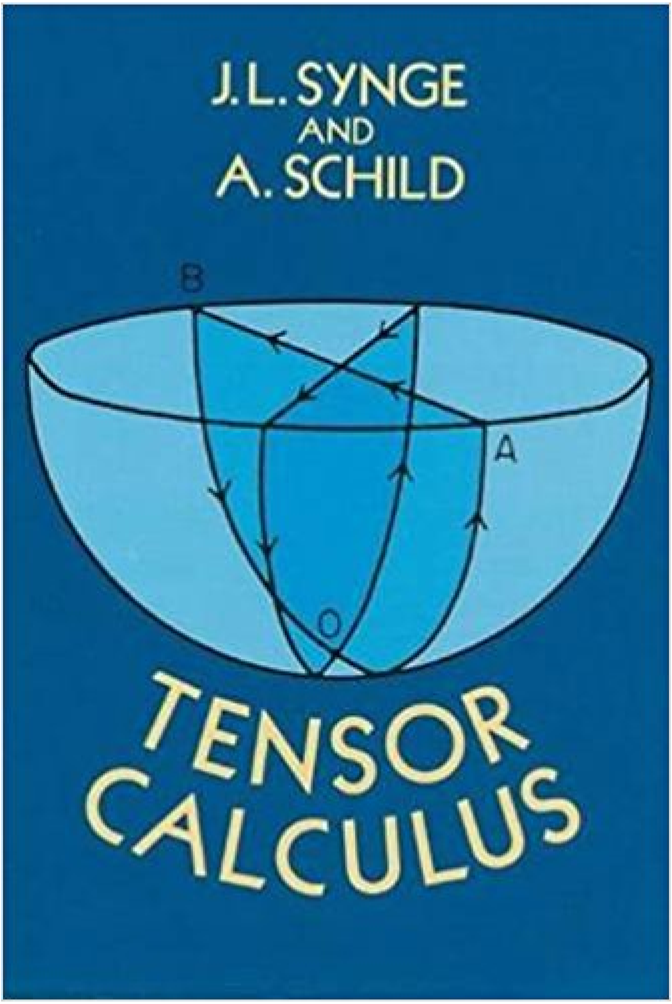
Tensor Calculus



Synopsis

Mathematicians, theoretical physicists, and engineers unacquainted with tensor calculus are at a serious disadvantage in several fields of pure and applied mathematics. They are cut off from the study of Reimannian geometry and the general theory of relativity. Even in Euclidean geometry and Newtonian mechanics (particularly the mechanics of continua), they are compelled to work in notations which lack the compactness of tensor calculus. This classic text is a fundamental introduction to the subject for the beginning student of absolute differential calculus, and for those interested in the applications of tensor calculus to mathematical physics and engineering.Tensor Calculus contains eight chapters. The first four deal with the basic concepts of tensors, Riemannian spaces, Riemannian curvature, and spaces of constant curvature. The next three chapters are concerned with applications to classical dynamics, hydrodynamics, elasticity, electromagnetic radiation, and the theorems of Stokes and Green. In the final chapter, an introduction is given to non-Riemannian spaces including such subjects as affine, Weyl, and projective spaces. There are two appendixes which discuss the reduction of a quadratic form and multiple integration. At the conclusion of each chapter a summary of the most important formulas and a set of exercises are given. More exercises are scattered throughout the text. The special and general theory of relativity is briefly discussed where applicable.

Book Information

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Customer Reviews

I did a graduate level class in tensors back in 1971, and thought that this book would be good for review (if you can call it review after 40+ years) and self-study. The book takes the classical "indices" approach, which was how it was done back in my day, too, so I thought everything would be fine.Now, not being familiar with a modern differential geometry approach, I won't criticize the book as being dated. But I will criticize it as being a little obscure. Tensor calculus is inherently a sort of messy topic, and not the clearest thing ever, so there's all the more reason to provide text and explanations that don't do a lot more than sketch out the ideas and leave the rest as the proverbial "exercise for the reader."The book is thorough and complete. Everything of importance to the classical approach is covered, and more. But if you haven't seen any of this before and you're attempting self-study, I think it's going to be a lot of work. Not that work is bad, but some of it is unnecessary. I'd rather concentrate on applications than on filling in the sketchy explanations provided in this book.I'd have to say, pass this one up and get something, if not newer, then at least more detailed in its exposition.

This book went completely over my head. I say this as a graduate engineer wanting to learn more about tensors for continuum mechanics. No help at all from this book: zero.

I find it rather strange that several of the negative reviews of Synge & Schild are really negative opinions about the lack of elegance of tensors, compared to the new-fangled differential forms.This is like blaming the author of a book on the grammar of a language, because you think the grammar is too complicated. Sorry, but the author of the book can only explain as well as he/she can the grammar that exists, it's not within his scope to improve upon it!This book is a relatively easy-to-read and carefully motivated text on tensor calculus, a subject that does tend to lead to that eye-glazing-over effect because of the numerous indices. It does a very good job of keeping the focus on the concepts, without getting too bogged down in the equations - most of the time.Does it need to be said that this subject is still useful, despite its comparative inelegance, because so many classic texts and articles on general relativity use this language? Will those who scorn to deal with indices demand that all these papers be properly translated into differential forms before they deign to read them?

This book greatly enhanced my understanding of general relativity and special relativity, this book for the subject was written at an most advanced level I would believe.

Absolutely a great book. I have read it twice and have learned a great deal from it. It has answered some questions that have been bugging me for years. Well worth the read for anyone serious about learning Tensor Calculus.

My background is being an electrical engineer with casual interest in physics. I was trying to start understanding more about relativity.Being honest this was my first book on the topic of tensors. What can I say? tough start. Don't even bother if you aren't a graduate student (IMHO). Complex notation, fast paced (not for the student), few resolved exercises, no companion material (web pages or others).I think this book is thought to be a companion book for someone who already has a certain knowledge about tensors.In the book, there are many exercises but none of them is resolved in details, on the contrary, they are left to the reader as a "homework". Which is a pity because is in the exercises where you can hope to find some help to understand this complex subject.As far as I know There is not a place in Internet where one can check the resolution of the exercises in this book.

This is probably the clearest classical treatment of tensors you can find. Tensors are objects whose components transform in some linear and homogeneous way. This is the original definition, by Ricci, the founder of the theory. Today one prefers to define them as the members of some vector space and avoid talking of components. However, most physicists adhere to the classical formulation. After all this was the tensor calculus known to Einstein! Anyway the job is extremely well done: you end up knowing about parallel transportation and covariant derivative, curvature tensor and several applications. You'll be able to write the Laplacian operator in any corrdinate system whatsoever, and so on. I think the chapter on Integration is much more difficult than the others, but, then, invariant integration is the realm of exterior differential forms, and building them from tensors is inevitably clumsy.

This is my first review on .com. I read bad reviews for this excellent book, so I react.This is my first book on Tensor calculus, I have reach more than half on it, and what can I say is that this is a book written by physicists for physicists. There are many subjects dealt with, this is possible because of the conciseness of the author's style. The exercises interlaced into the text are rather easy to my point of view, and allow to ensure that the previous points have been understood correctly.No differential form here, but most of the textbooks and articles in circulation use index calculus rather than differential forms or geometric algebra: there is no way to avoid this notation.Before that, I began a book where differential geometry is presented with the modern approach, and I must say that the physicist approach in Synge&Schild better suits my needs.For me, the next step is to read about differential forms more seriously, and after that about geometric algebra, to compare the three approaches. But after this first book, I will be able to understand most of the articles about relativity, and this is the main point for me.