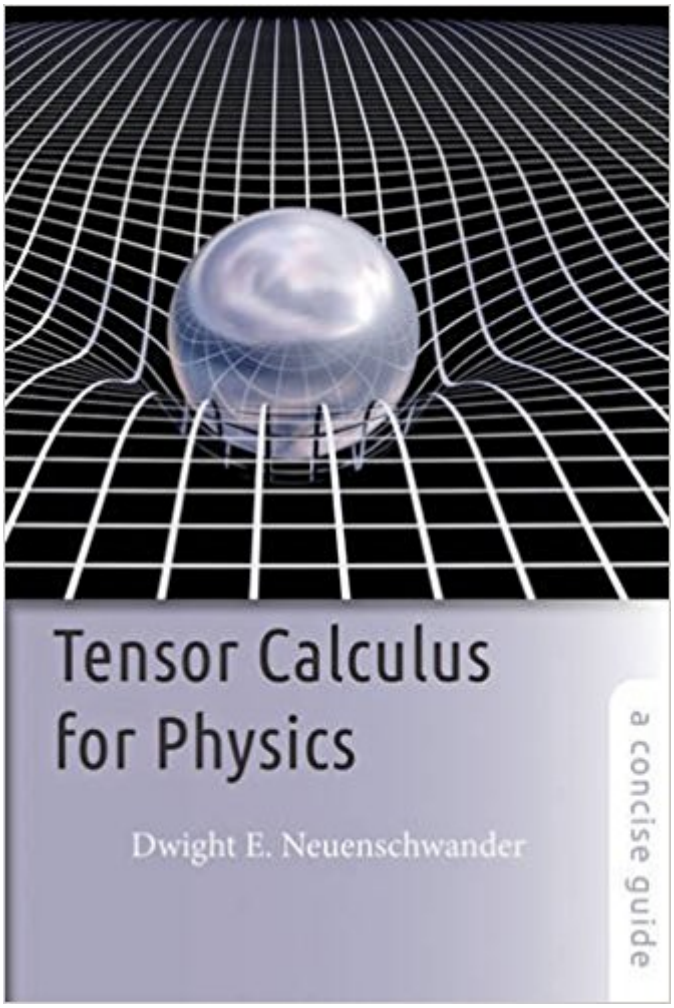
Tensor Calculus For Physics: A Concise Guide



Synopsis

Understanding tensors is essential for any physics student dealing with phenomena where causes and effects have different directions. A horizontal electric field producing vertical polarization in dielectrics; an unbalanced car wheel wobbling in the vertical plane while spinning about a horizontal axis; an electrostatic field on Earth observed to be a magnetic field by orbiting astronautsâ •these are some situations where physicists employ tensors. But the true beauty of tensors lies in this fact: When coordinates are transformed from one system to another, tensors change according to the same rules as the coordinates. Tensors, therefore, allow for the convenience of coordinates while also transcending them. This makes tensors the gold standard for expressing physical relationships in physics and geometry. Undergraduate physics majors are typically introduced to tensors in special-case applications. For example, in a classical mechanics course, they meet the "inertia tensor," and in electricity and magnetism, they encounter the "polarization tensor." However, this piecemeal approach can set students up for misconceptions when they have to learn about tensors in more advanced physics and mathematics studies (e.g., while enrolled in a graduate-level general relativity course or when studying non-Euclidean geometries in a higher mathematics class). Dwight E. Neuenschwander’s Tensor Calculus for Physics is a bottom-up approach that emphasizes motivations before providing definitions. Using a clear, step-by-step approach, the book strives to embed the logic of tensors in contexts that demonstrate why that logic is worth pursuing. It is an ideal companion for courses such as mathematical methods of physics, classical mechanics, electricity and magnetism, and relativity.

Book Information

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Customer Reviews

"Dr. Neuenschwander has written the book I wish I could have read when I was learning mathematical physics. It is colloquial yet authoritative, with many treasures lurking within the chapters. The book brings a breath-taking cohesion to the varied ideas about vectors and tensors that are typically spread across the undergraduateâ ™s school terms haphazardly. It is the book Iâ ™ll want to have nearby next time I teach special or general relativity, or upper-level electromagnetism or rotational dynamics, as much for the historical tidbits and definitive examples, as for its asides about vocabulary and conventions and for its bibliography." (Gary White, Editor, The Physics Teacher, American Association of Physics Teachers)"This book is well written and has sufficient rigor to allow students to use it for independent study." (Choice)"An introductory Tensor Calculus for Physics book is a most welcome addition... Professor Neuenschwander's book fills the gap in robust fashion." (American Journal of Physics)

Dwight E. Neuenschwander is a professor of physics at Southern Nazarene University. He is a columnist for the Observer, the magazine of the Society for Physics Students, and the author of Emmy Noether's Wonderful Theorem, also published by Johns Hopkins, and How to Involve Undergraduates in Research: A Field Guide for Faculty.

I am yet another buyer of this book now returned to for refund. And, the reason is as others have said. The printing has serious and major flaws making the book totally unusable for study. But, from what I did read, I think it is an excellent book and it has all the merits of being great when these printing problems get fixed. I am writing this because needs to yank these printings of this book with the flaws from their shelves and save others from the disappointment and hassle of returning the book to . It would be nice if had some kind of alert system so that they can let us know when a fixed printing of the book is available.The one-star review is unfortunate -- calls this level "I Hate It" -- but, I don't hate the book, just the flawed manufacture of the book!

Very quickly; this book may be the best introduction to tensors there is. However, earlier I had given the book 1 star based upon that particular printing which was unspeakably bad and which made the book unreadable. Therefore I had sent the book back to . I heard nothing from anybody about it but I noticed simply by using the "Look inside" feature that the printing had been corrected. I have now secured a second copy from which is perfect, and I needed to correct the record!

Why are sellers even selling this book??? There are so many parts of formulas missing, starting with an obviously-missing sigma expression near the bottom page 8. But it will fool a casual observer, since for some reason the rest of the print is there.These are taken from the 2015 printing. These are just a couple of examples, but there are HUNDREDS of affected pages, making it useless for study. This book should have been recalled by the publisher!!DON'T BUY IT -- (SADLY...) THIS IS A BOOK YOU SHOULD SIMPLY AVOID.

Imagine a serious book on mathematics without equations! Almost EVERY equation has parts of it that are simply not printed. Certain letters in words are not printed either. There are simply gaps in words where letters would have gone. Defective book! Because others have had the same problem, I am asking for a refund.

An excellent book, though, not as lucid as Fleich's "A Student's Guide to Vectors and Tensors." After reading Fleich's, this book is an excellent study for those wishing to learn more about tensors and their applications. It is more mathematically rigorous than Fleich's, but not a book , I would think, for mathematicians.

This is for the paperback version.This copy has many of the greek letters missing (throughout the entire book) making it impossible to read. It is incredibly obvious so I wonder how this got through the proof reading??

Excellent text, bridging the gap between introductory vector algebra for physic and advanced differential geometry. Worth having!

The topics are great and the book condition was excellent. The only issue was that every topic was covered briefly and there weren't many illustrations. A lot of reading and essentially no problems to solve. This is a good book for people interested in the philosophy of tensor calculus and it's application to higher level physics.

Workbook: Electricity and Magnetism (Learn Physics with Calculus Step-by-Step) (Volume 2) Essential Calculus-based Physics Study Guide Workbook: The Laws of Motion (Learn Physics with Calculus Step-by-Step Book 1) 100 Instructive Calculus-based Physics Examples: Electricity and Magnetism (Calculus-based Physics Problems with Solutions Book 2) An Advanced Introduction to Calculus-Based Physics (Mechanics) (Physics with Calculus Book 1) 100 Instructive Calculus-based Physics Examples: The Laws of Motion (Calculus-based Physics Problems with Solutions) Tensor Calculus Elements of Tensor Calculus (Dover Books on Mathematics) The Scalar-Tensor Theory of Gravitation (Cambridge Monographs on Mathematical Physics) At the Frontier of Spacetime: Scalar-Tensor Theory, Bells Inequality, Machs Principle, Exotic Smoothness (Fundamental Theories of Physics) Bundle: Calculus: Early Transcendentals, Loose-Leaf Version, 8th + WebAssign Printed Access Card for Stewart's Calculus: Early Transcendentals, 8th Edition, Multi-Term Student Solutions Manual for Stewart/Day's Calculus for Life Sciences and Biocalculus: Calculus, Probability, and Statistics for the Life Sciences Calculus for Biology and Medicine (Calculus for Life Sciences Series) Calculus, Vol. 2: Multi-Variable Calculus and Linear Algebra with Applications to Differential Equations and Probability The Absolute Differential Calculus (Calculus of Tensors) (Dover Books on Mathematics) Student Solutions Manual for Stewart's Single Variable Calculus: Early Transcendentals, 8th (James Stewart Calculus)