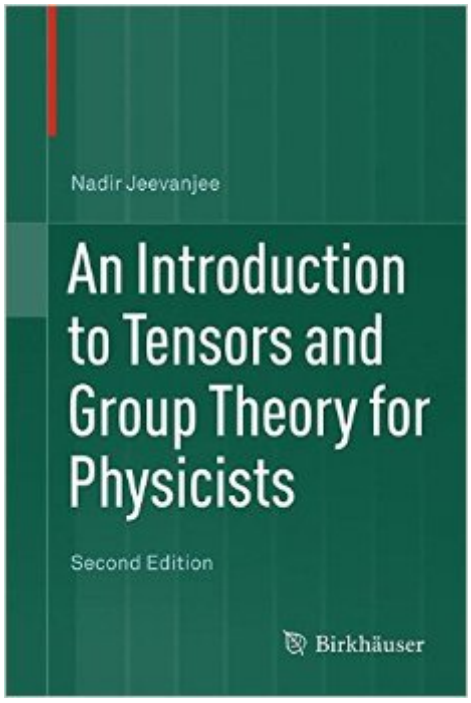
An Introduction To Tensors And Group Theory For Physicists



Synopsis

The second edition of this highly praised textbook provides an introduction to tensors, group theory, and their applications in classical and quantum physics. Both intuitive and rigorous, it aims to demystify tensors by giving the slightly more abstract but conceptually much clearer definition found in the math literature, and then connects this formulation to the component formalism of physics calculations. New pedagogical features, such as new illustrations, tables, and boxed sections, as well as additional â œinvitationâ • sections that provide accessible introductions to new material, offer increased visual engagement, clarity, and motivation for students.Part I begins with linear algebraic foundations, follows with the modern component-free definition of tensors, and concludes with applications to physics through the use of tensor products. Part II introduces group theory, including abstract groups and Lie groups and their associated Lie algebras, then intertwines this material with that of Part I by introducing representation theory.Â Examples and exercises are provided in each chapter for good practice in applying the presented material and techniques.Prerequisites for this text include the standard lower-division mathematics and physics courses, though extensive references are provided for the motivated student who has not yet had these.Â Advanced undergraduate and beginning graduate students in physics and applied mathematics will find this textbook to be a clear, concise, and engaging introduction to tensors and groups.Reviews of the First Editionâ œ[P]hysicist Nadir Jeevanjee has produced a masterly book that will help other physicists understand those subjects [tensors and groups] as mathematicians understand themâ | From the first pages, Jeevanjee shows amazing skill in finding fresh, compelling words to bring forward the insight that animates the modern mathematical viewâ ‖[W]ith compelling force and clarity, he provides many carefully worked-out examples and well-chosen specific problemsâ | Jeevanjeeâ ™s clear and forceful writing presents familiar cases with a freshness that will draw in and reassure even a fearful student.Â [This] is a masterpiece of exposition and explanation that would win credit for even a seasoned author.â •â •Physics Today"Jeevanjeeâ ™s [text] is a valuable piece of work on several counts, including its express pedagogical service rendered to fledgling physicists and the fact that it does indeed give pure mathematicians a way to come to terms with what physicists are saying with the same words we use, but with an ostensibly different meaning.Â The book is very easy to read, very user-friendly, full of examples...and exercises, and will do the job the author wants it to do with style.â •â •MAA Reviews

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Customer Reviews

I read this book during my first year of graduate school. For a little background, I was a math and physics double major as an undergraduate, but I didn't take any courses on Tensors or Lie Groups, which is why I decided to look into this text.This book introduces Tensors and Group Theory with far more rigor than you normally get within a Physics classroom, grad or undergrad. If you don't have a mathematics background, you should be OK looking at this book. While it certainly helps to have exposure to proof based math, the book starts at the foundations of groups and linear algebra so all the topics build naturally. In short, you will never be lost if you read carefully, so it's also perfect for an advanced undergraduate as well.The underlying mathematical structure of Physics that is covered in this text is usually only superficially learned through rote problem solving during grad school. This is a significant deficiency in graduate Physics pedagogy that this book concisely addresses. It's a shame no one has written something this accessible sooner.The author is very good at breaking the concepts down in his exposition. It is definitely worth rereading from time to time, as there is usually a new insight to be gained from the text. The exercises and examples in the book are also well chosen. They are usually pretty short, but very illustrative. It's pretty much always clear how the concepts tie to Physics when you work through them.In short, I found this book to be extremely helpful. It provides a good framework to understand much of the advanced mathematics that one encounters in graduate school.

This book gives a self-contained introduction to tensors and group theory in a very pedagogical style. It moves quickly and stays interesting without losing the reader. My favorite thing about it is

the quasi-rigorous approach: rather than proving every statement, Jevanjee provides references to other authors for the proofs and instead focuses primarily on definitions, concepts, and examples. He also takes a thoroughly modern perspective (e.g. tensors are linear functions), though not without making helpful connections to the older terminology used frequently in physics books.

Jeevanjee's textbook is excellent. I am a Materials Scientist with a Physics background, and yet tensors have always been a little mysterious to me. This text lays the mathematical framework you need in order to understand tensors (and group theory), while providing concrete examples in physical contexts; everything is exceptionally clear and easy to understand. I highly recommend this book to any Physicist who feels the way I used to feel about tensors (i.e. you can work the math, but don't have a clear understanding of why it's working). Great text.

As with several other reviewers, I read this book in my first year of grad school. The book is laid out in a tremendously pragmatic fashion. The first chapter is a short survey and does a great job getting you to understand the general thrust of the book's writing style and level, so I would recommend reading those quick 10ish pages on the preview to see if this title is for you.The book's paradigm is the simple and effective mathematical style of a definition followed by a set of examples or case studies, but the writing isn't as dry and intolerable as some of the mathematical literature will look to the first year physics graduate student or advanced undergrad. I admittedly have not read this book cover to cover. On my first run, I went through chapters 1, 2, then 4 in about a 3 week span during a break in classes and I came back near the very top of my class in terms of understanding of group theory for the needs of classical and quantum mechanics. The presentation of the material very clear, pedagogical, and most importantly mathematically precise (something that seems completely lost on most authors of the subject in the physics literature).Mr. Jeevanjee did a great job making the material enjoyable to the interested student, and weaving the chapter on tensors into the material in a way that it can be skipped without much loss of understanding for students who only care for the vector algebra and group theory portions. I will be on the lookout for any other Nadir Jeevanjee titles in the future, and I recommend this book with the highest praise for any physics student who feels they want a precise mathematical introduction to theory of groups for coursework or a handy reference. This is the book that I go to when I need a refresher on the algebra of groups and the book I learned from, that is a rare occurrence.

Very understandable exposition of tensors theory for the needing of Mathematical Physics (that is,

Rational Mechanics, Quantum Mechanics and General Relativity). Also useful the equally large part about Lie Groups and Algebra. It is not about calculations (for this you can take a Schaum) but about the nature of tensors: it gives you the sensation of finally grasping the meaning of these objects, beyond usual definitions. Nice english also for the foreigner. Recommended to students. Worth the price.

I started reading this book for fun as a high schooler, and continue to read and re-read as I work through my grad-level quantum course. To be brief, I wish every physicist knew how to explain math like Jeevanjee. He does not shy away from formalism or brush subtleties under the rug, yet he also lets the reader know what "the heart of the matter" is.

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