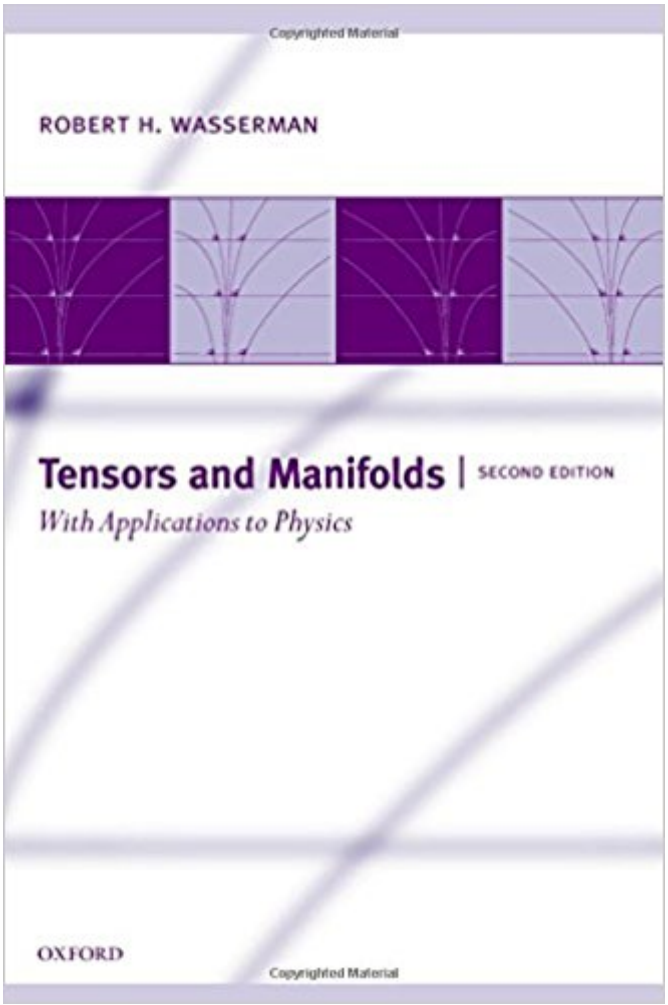
Tensors And Manifolds: With Applications To Physics



Synopsis

This book is a new edition of "Tensors and Manifolds: With Applications to Mechanics and Relativity" which was published in 1992. It is based on courses taken by advanced undergraduate and beginning graduate students in mathematics and physics, giving an introduction to the expanse of modern mathematics and its application in modern physics. It aims to fill the gap between the basic courses and the highly technical and specialized courses which both mathematics and physics students require in their advanced training, while simultaneously trying to promote at an early stage, a better appreciation and understanding of each other’s discipline. The book sets forth the basic principles of tensors and manifolds, describing how the mathematics underlies elegant geometrical models of classical mechanics, relativity and elementary particle physics. He existing material from the first edition has been reworked and extended in some sections to provide extra clarity, as well as additional problems. Four new chapters on Lie groups and fibre bundles have been included, leading to an exposition of gauge theory and the standard model of elementary particle physics. Mathematical rigor combined with an informal style makes this a very accessible book and will provide the reader with an enjoyable panorama of interesting mathematics and physics.

Book Information

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Customer Reviews

`Review from previous edition Clearly written and self-contained and, in particular, the author has succeeded in combining mathematical rigor with a certain degree of informality in a satisfactory way.

As such, this work will certainly be appreciated by a wide audience.’ Mathematical Reviews, August 1993

Robert H. Wasserman is Professor Emeritus of Mathematics at Michigan State University, USA.

This book is a gem, and I’m surprised no one has reviewed it before. I have read about 2/3 of the book -- some parts rather superficially but others carefully and some even more than once -- so I think I can offer a reasonably informed review that might help others, especially autodidacts like me who are interested in the (modern) mathematical foundations of physics.Based on lectures given to advanced undergraduates and beginning graduate students in mathematics and physics, this book focuses on the algebraic and geometric structures required for an in-depth understanding of much of modern physics, in particular classical mechanics, special and general relativity and the standard model. The first 17 chapters take one from vector spaces to tensors and the exterior algebra of Grassmann, and then on to topological spaces and differential manifolds, including vector and tensor fields and connections on manifolds. Chapters 18 - 24 treat various physics applications, including several chapters on special and general relativity. Then the text moves on to Lie groups and fiber bundles, concluding with a very short chapter introducing gauge theory and its relevance to the standard model.Of particular note is that Prof. Wasserman takes pains to provide motivation for the mathematics, so you always know how the current topics relate to the previous and upcoming ones and, very importantly, why the mathematics is needed and what the intuitive meaning and implications are. The mathematics is carefully developed and the notational conventions are very clear. There is also a very helpful notation index as well as a lot of cross-referencing, making it easy to move back and forth.All in all, the book is well suited for self-study but unfortunately, there are no answers to problems and, even more unfortunately, answers to some problems are used in a few proofs. I did not deduct a star for this drawback because the exposition as a whole is so lucid and reader-friendly. Whenever I forget something or some statement in a physics book is too informal or just confuses me, I check out the topic in Wasserman to get my head right.I recommend checking it out via Search Inside.

This is a nice and useful differential geometry book, designed for people who really wants (and needs) to calculate effectively some things....let’s say physicists. If you want something more than just metaphysics speculation (index free ultra compressed expressions...), then you will need to drop to local full indices equations...That’s for the content. But the material quality of the paperback

version of this book is terrible ! The covers, the binding, ...just the quality of a glued bunch of photocopies, but for a high price (USD 49.53). Of course, you can't leave the (let's say) book opened over a table, you will have to break it....I won't buy another Oxford paperback edition anymore.

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