



# A Student's Guide to Vectors and Tensors

By Daniel A. Fleisch

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**A Student's Guide to Vectors and Tensors** By Daniel A. Fleisch

Vectors and tensors are among the most powerful problem-solving tools available, with applications ranging from mechanics and electromagnetics to general relativity. Understanding the nature and application of vectors and tensors is critically important to students of physics and engineering. Adopting the same approach used in his highly popular *A Student's Guide to Maxwell's Equations*, Fleisch explains vectors and tensors in plain language. Written for undergraduate and beginning graduate students, the book provides a thorough grounding in vectors and vector calculus before transitioning through contra and covariant components to tensors and their applications. Matrices and their algebra are reviewed on the book's supporting website, which also features interactive solutions to every problem in the text where students can work through a series of hints or choose to see the entire solution at once. Audio podcasts give students the opportunity to hear important concepts in the book explained by the author.



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#### Review

"This book is an excellent resource for science and engineering students who can use it as a quick reference while studying topics such as physics, statics, dynamics, electromagnetism, and fluid mechanics. The author is commended for his effective and elucidating style, with graphical explanations and without mathematical long-windedness. Reading specific sections in this book a priori not only serves as a just-in-time preparation, but also empowers students to tackle subjects that require a good grasp of vector algebra, vector differential operators, vector transformation, and tensors. Highly recommended."

R.N. Laoulache, University of Massachusetts, Dartmouth for Choice Magazine

"This book is a short, concise teaching aid devoted to vector analysis and tensors. Each chapter ends with a set of problems whose interactive solutions can be found on a website. This is both helpful and innovative. One of the author's goals for this book is to provide in-depth coverage of covariant and contravariant tensors. This is timely, since some undergraduate physics textbooks are now using both types of tensors. Fleisch's book is an excellent and challenging resource for students in this subject area."

Albert C. Claus, physics department at Loyola University, Chicago for Optics and Photonics News

"This highly readable introductory book will be of great assistance to those taking undergraduate or graduate courses and meeting tensors for the first time"

George Matthews, AMIMA, IMA Book Reviews

#### About the Author

Daniel Fleisch is an Associate Professor in the Department of Physics at Wittenberg University, where he specializes in electromagnetics and space physics. He is the author of *A Student's Guide to Maxwell's Equations* (Cambridge University Press, 2008).

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