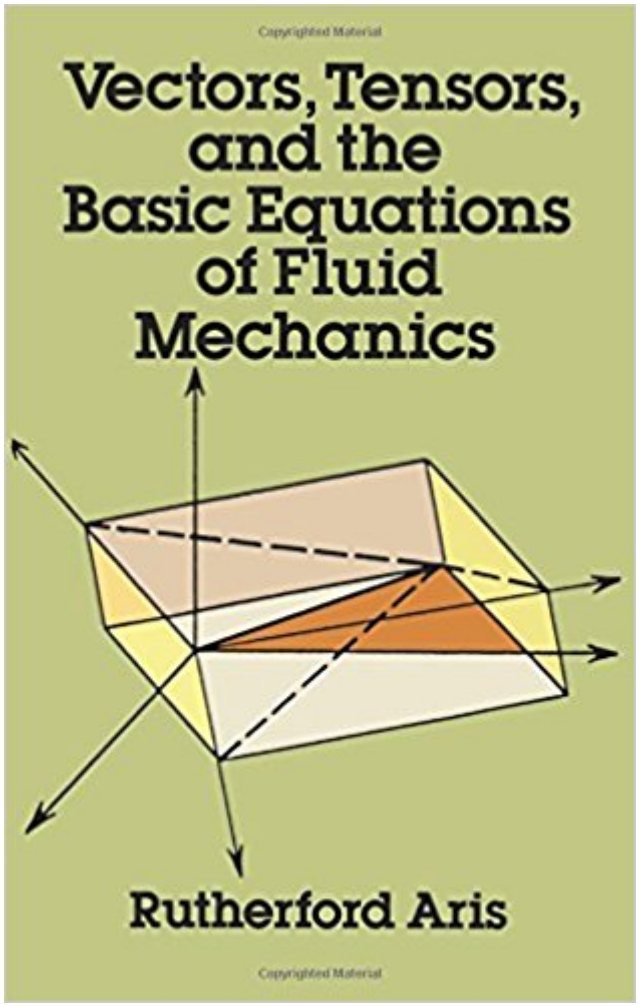
Vectors, Tensors And The Basic Equations Of Fluid Mechanics (Dover Books On Mathematics)



Synopsis

This introductory text is geared toward engineers, physicists, and applied mathematicians at the advanced undergraduate and graduate levels. It applies the mathematics of Cartesian and general tensors to physical field theories andÂ demonstrates them chiefly in terms of the theory of fluid mechanics. Numerous exercises appear throughout the text. 1962 edition.

Book Information

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Customer Reviews

Note: I am halfway through the book, about to go into the chapter on tensors, though I am already familiar with them, having already gone through Pavel Grinfeld’s excellent "Introduction to Tensor Analysis and the Calculus of Moving Surfaces".THE NEGATIVEAs mentioned in other reviews, this book would best be described as a thorough introduction to the mathematics of fluid mechanics, along with a concise refresher on the necessary foundations from vector calculus, linear algebra, and tensors (some of which is found in the appendix). Note: the basic equations of FM are initially derived in Cartesian coordinates in the first half of the book, and later reformulated using a coordinates-free approach in the second half of the book, following the chapter on tensors (chapter 7). As such, the book either skims or skips over core concepts from basic physics, specifically from rigid-body dynamics and thermodynamics. For example, the "moment of linear momentum" (that’s the "angular momentum" caused by body forces and normal stresses), is never properly introduced as a physical concept. Neither is force, nor body torque (also referred to as the "moment of the external couple"), nor the concept of energy and energy conservation from thermodynamics, etc.

The book uses these various physical concepts and laws, however, in order to lay out basic equations as a starting point, from which the author then derives equations relevant to fluid mechanics. Also absent is a proper, gradual introduction to the various fluid types and what their properties mean from a physical standpoint (ex: what is a non-elastic fluid? Is it the same as a incompressible fluid? what is viscosity? pressure?, ...).