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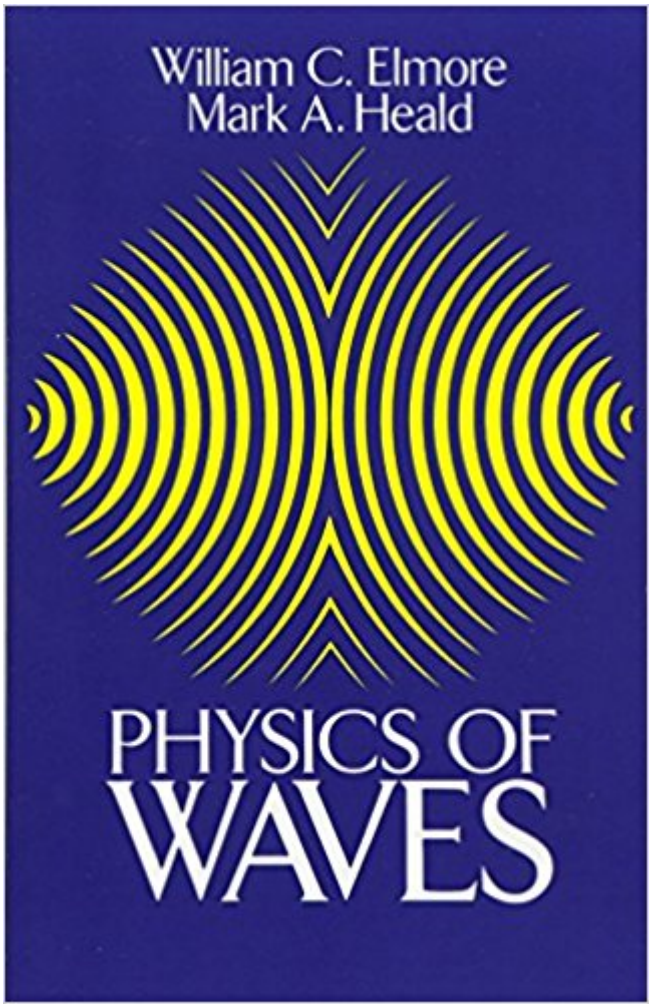
Physics Of Waves (Dover Books On Physics)



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Synopsis

Because of the increasing demands and complexity of undergraduate physics courses (atomic, quantum, solid state, nuclear, etc.), it is often impossible to devote separate courses to the classic wave phenomena of optics, acoustics, and electromagnetic radiation. This brief comprehensive text helps alleviate the problem with a unique overview of classical wave theory in one volume.By examining a sequence of concrete and specific examples (emphasizing the physics of wave motion), the authors unify the study of waves, developing abstract and general features common to all wave motion. The fundamental ideas of wave motion are set forth in the first chapter, using the stretched string as a particular model. In Chapter Two, the two-dimensional membrane is used to introduce Bessel functions and the characteristic features of waveguides. In Chapters Three and Four, elementary elasticity theory is developed and applied to find the various classes of waves that can be supported by a rigid rod. The impedance concept is also introduced at this point. Chapter Five discusses acoustic waves in fluids.The remainder of the book offers concise coverage of hydrodynamic waves at a liquid surface, general waves in isotropic elastic solids, electromagnetic waves, the phenomenon of wave diffraction, and other important topics. A special feature of this book is the inclusion of additional material designed to encourage the serious student to investigate topics often not covered in lectures. Throughout, the mathematics is kept relatively simple (mostly differential equations) and is accessible to advanced undergraduates with a year of calculus. In addition, carefully selected problems at the end of each section extend the coverage of the text by asking the student to supply mathematical details for calculations outlined in the section, or to develop the theory for related cases.Impressively broad in scope, Physics of Waves offers a novel approach to the study of classical wave theory â ” a wide-ranging but thorough survey of an important discipline that pervades much of contemporary physics. The simplicity, breadth, and brevity of the book make it ideal as a classroom text or as a vehicle for self-study.

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Customer Reviews

Because of the increasing demands and complexity of undergraduate physics courses it is often impossible to devote separate courses to the classic wave phenomena of optics, acoustics, and electromagnetic radiation. This brief but comprehensive text helps alleviate the problem with a unique overview of classical wave theory in one volume.

This book covers a lot of conceptual territory rather rapidly, reaching approximate analytic techniques associated with diffraction, beginning from almost first principles. To do this, the authors hurry through introductory material, and sometimes skimp on development of more complex topics. That said, the book does a good job of covering waves in the many forms they appear in physics. The book is a review. This requires the reader to be familiar with at least about half of the material in the book, or you will probably get frustrated quickly, or have to go elsewhere for more details / development. Another prerequisite for this book is mathematics through vector calculus and some exposure to advanced engineering math.The book is originally from the 1960s; it is not the most modern or up-to-date book on waves. Despite this, the fundamentals really never change, and this book has a pretty good pedagogical side to it. I would not recommend this as a book to introduce waves with, or to use in any sort of introductory sense (possibly in conjunction with a standard textbook). I would recommend the book to be read after the details and examples of the basics have been covered. This book will help the reader to fit the ideas already learned into the larger framework of physics and waves, by introducing a few new ideas and covering previous ideas in a slightly different way.Comparatively, the bookÂ Almost All About WavesÂ is about equivalent to chapter 8 of this book. This book does much better introducing things deliberately and covers much more ground, and I think is therefore much more useful.

This is easily one of my favorite physics texts. Derivations are concise and straightforward. This is definitely not a "bedtime reading" textbook with lots of filler. If you want to get down to business in a wide-range of wave phenomena and prefer a rigorous, theoretical treatment pick up this Dover

book.

Very good reference book!

just few points:(1) This is not a book for a undergrad taking any wave class for the first time(2) It’s such a great summary book for grad students who already learned waves at least once (EM/acoustic). Reading this book is such an enjoyable experience, that scattered knowledge of waves finally merges together, and different physics eventually turn out to be just some special treatment to the same wave equation (mathematically).it’s a great book for student who really want to have a profound understanding of what really wave is, but it might be a bad one if you just want to pass your exam.Physics of Waves

This is a decent text that covers the physics of waves, predominately mechanical waves. Its no more than a simple introduction and does not offer much insight into interesting phenomena such as anisotropy and periodic composite materials. I don’t have an extensive collection of texts of wave propagation in materials but I’m sure there are plenty out there that are better than this one.

This book goes through the steps of explaining quite clearly how waves can be described using some basic math and that helps a lot those who are not familiar with the subject.

Terrible! There were no problems given to solve with answers. This is not the book for self-study.

Elmore and Heald is a very hit and miss book. The first chapter about simple transverse waves on strings is pretty good except for the confusing treatment of Fourier series (which I can’t imagine would help anyone who hasn’t seen them before). Chapter 3 on elastic theory was fine too and the EM waves stuff in chapter 8 wasn’t bad.However, the introduction to tensors in chapter 7 and their application to more complex elastic theory was horrible. The dyadic notation they use is really old-fashioned and their presentation is confusing. The stuff in chapter 12 on fourier transforms and integrals wasn’t that great either.More generally, the problem is that it spends too much time diving into excruciating detail without teaching and emphasizing important concepts. Not to mention the fact that there are no example problems.

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