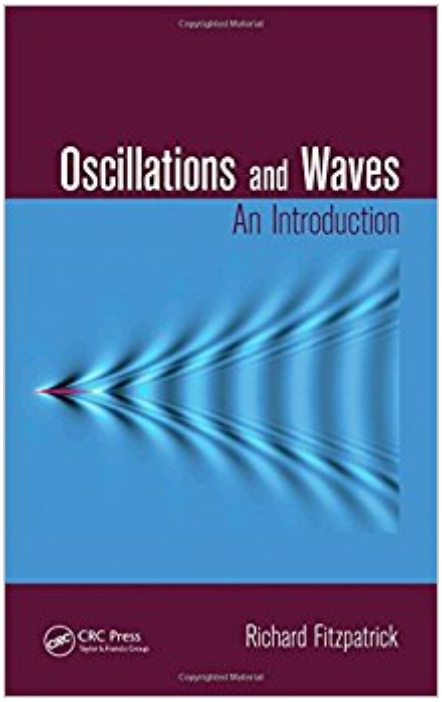
Oscillations And Waves: An Introduction



Synopsis

Bridging lower-division physics survey courses with upper-division physics courses, Oscillations and Waves: An Introduction develops a unified mathematical theory of oscillations and waves in physical systems. Emphasizing physics over mathematics, the author includes many examples from discrete mechanical, optical, and quantum mechanical systems; continuous gases, fluids, and elastic solids; electronic circuits; and electromagnetic waves. Assuming familiarity with the laws of physics and college-level mathematics, the book focuses on oscillations and waves whose governing differential equations are linear. The author covers aspects of optics that crucially depend on the wave-like nature of light, such as wave optics. He also introduces the conventional complex representation of oscillations and waves later in the text during the discussion of quantum mechanical waves. This helps students thoroughly understand how to represent oscillations and waves in terms of regular trigonometric functions before using the more convenient, but much more abstract, complex representation. Based on the authorÃ¢â ¬â„¢s longstanding course at the University of Texas at Austin, this classroom-tested text helps students acquire a sound physical understanding of wave phenomena. It eases studentsÃ¢â ¬â„¢ difficult transition between lower-division courses that mostly encompass algebraic equations and upper-division courses that rely on differential equations.

Book Information

Paperback: 295 pages
Publisher: CRC Press; 1 edition (January 9, 2013)
Language: English
ISBN-10: 1466566086
ISBN-13: 978-1466566088
Product Dimensions: 9 x 6.1 x 0.6 inches
Shipping Weight: 15.2 ounces (View shipping rates and policies)
Average Customer Review: 3.6 out of 5 stars 2 customer reviews
Best Sellers Rank: #200,472 in Books (See Top 100 in Books) #46 inÃ Â Books > Science & Math > Physics > Solid-State Physics #137 inÃ Â Books > Science & Math > Physics > Electromagnetism #153 inÃ Â Books > Science & Math > Physics > Mechanics

Customer Reviews

Oscillations and waves are ubiquitous in many physical situations. Universities now realise that instead of discussing these phenomena in different branches of physics, it is much more productive

to have a core physics undergraduate course which encapsulates the reach physical phenomena such as advection, dispersion, diffraction, as well as non-linearity (solitons, shocks and chaos) in a single, generic course that encompasses the relevant elements of fluid dynamics, mechanics, optics, plasmas and quantum mechanics. There are surprisingly few good and more importantly recent, up-to-date textbooks available on the subject of Oscillations and Waves. Richard Fitzpatrick's Oscillations and Waves: An Introduction is an excellent addition to the existing literature on the subject. The book provides a clear, systematic, comprehensive and yet concise treatment of the subject. The emphasis is placed on physical interpretation rather than mathematical rigour, although the author certainly presents the material at the right mathematical level, commensurate with an advanced undergraduate course. The book will be equally useful for physics and engineering students, as well as mathematics students who want to get physical insight beyond the mathematical equations. The book benefits from very useful exercises which are accompanied by a solutions manual. As a physics educator, I would recommend this book without a reservation to both lecturers as excellent teaching material and to students as a learning resource which will guide them through the exciting world of waves, oscillations and patterns that are all around us. Ã¢â ¬â ¢David Tsiklauri, Senior Lecturer in Astronomy, School of Physics and Astronomy, Queen Mary University of London, UK "Ã¢â ¬Â¦ The treatment is thorough Ã¢â ¬Â¦ An unusual approach of the book is to postpone any use of complex representations until they are needed under the topic of quantum mechanics. The author argues that this allows the text to stress physical interpretations over mathematical solutions. Each chapter includes homework problems. Summing Up: Recommended. Lower- and upper-division undergraduates.Ã¢â ¬â ¢E. Kincanon, Gonzaga University, in CHOICE Magazine, June 2013

Richard Fitzpatrick is a professor of physics at the University of Texas at Austin, where he has been a faculty member since 1994. He is a member of the Royal Astronomical Society, a fellow of the American Physical Society, and the author of MaxwellÃ¢â ¬â„¢s Equations and the Principles of Electromagnetism and An Introduction to Celestial Mechanics. He earned a MasterÃ¢â ¬â„¢s degree in physics from the University of Cambridge and a DPhil in astronomy from the University of Sussex.

I had Dr. Fitzpatrick for this physics course. This compact book is his lecture notes put together.He is a very good lecturer, and the book--although a bit hard to understand--explained very well physical phenomena and linked them to their mathematical derivations. However, if you want to fully

understand how the mathematics in it work (since they are not fully derived), you can always do a bit more research on your own.The problems at the end of each section are challenging, but the learning is worthwhile.Overall, I would definitely recommend it.

The book is nothing but another presentation of classical knowledge about mechanics of waves, plus something from the quantum mechanics. Similar materials can be found in Physics of waves by Elmore and Heald.But there is at least an obvious error in page 245, where the author mistakes euler's identity for complex number (relating e to sin and cos) as de moivre's theorem. This should have been caught if the book is put to peer review prior to publishing.

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