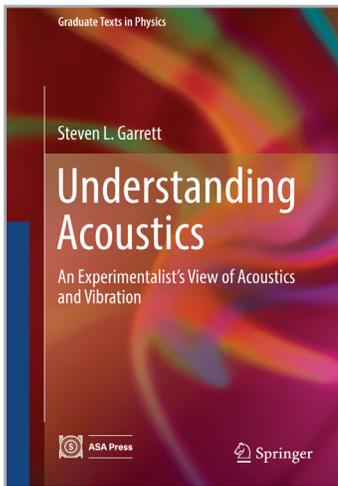


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Understanding Acoustics

An Experimentalist's View of Acoustics and Vibration



Author:
Steven L. Garrett

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Topics: Fluid and Aerodynamics

- Provides graduate-level treatment of acoustics and vibration suitable for use in courses and for self-guided study
- Highlights fundamental physical principles that can provide independent tests of the validity of numerical solutions and computer simulations
- Demonstrates use of approximation techniques that greatly simplify the mathematics without substantial decrease in accuracy
- Includes end-of-chapter problems and “Talk Like an Acoustician” boxes to highlight key terms introduced in the text

This textbook provides a unified approach to acoustics and vibration suitable for use in advanced undergraduate and first-year graduate courses on vibration and fluids. The book includes thorough treatment of vibration of harmonic oscillators, coupled oscillators, isotropic elasticity, and waves in solids including the use of resonance techniques for determination of elastic moduli. Drawing on 35 years of experi-

ence teaching introductory graduate acoustics at the Naval Postgraduate School and Penn State, the author presents a hydrodynamic approach to the acoustics of sound in fluids that provides a uniform methodology for analysis of lumped-element systems and wave propagation that can incorporate attenuation mechanisms and complex media. This view provides a consistent and reliable approach that can be extended with confidence to more complex fluids and future applications. *Understanding Acoustics* opens with a mathematical introduction that includes graphing and statistical uncertainty, followed by five chapters on vibration and elastic waves that provide important results and highlight modern applications while introducing analytical techniques that are revisited in the study of waves in fluids covered in Part II. A unified approach to waves in fluids (i.e., liquids and gases) is based on a mastery of the hydrodynamic equations. Part III demonstrates extensions of this view to nonlinear acoustics. Engaging and practical, this book is a must-read for graduate students in acoustics and vibration as well as active researchers interested in a novel approach to the material.

About the Author

Steven L. Garrett received his PhD in Physics from UCLA in 1977. He continued research in quantum fluids at the University of Sussex in England, followed by two years in the Physics Department at the University of California at Berkeley as a Fellow of the Miller Institute for Basic Research in Science. Prof. Garrett joined the faculty of the Naval Postgraduate School in 1982 where his research efforts were concentrated on the development of fiber-optic sensors and thermoacoustic refrigerators. Prof. Garrett left NPS in 1995 to assume his current position as a Professor of Acoustics in the Graduate Program in Acoustics at Penn State. In 2001, he was a Fulbright Fellow at the Danish Technical University and in 2008 a Jefferson Fellow in the US State Department. Prof. Garrett is a Fellow of the Acoustical Society of America and recipient of their Interdisciplinary Medal in Physical and Engineering Acoustics as well as the Popular Science Magazine Award for Environmental Technology, the Helen Caldecott Award for Environmental Technology, and the Rolex Award for Enterprise (environment category). He has been issued over two dozen patents.