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Physics : Acoustics

Garrett, Steven L.

Understanding Acoustics

An Experimentalist's View of Sound and Vibration

- Provides graduate-level treatment of acoustics and vibration suitable for use in courses, for self-study, and as a reference
- Highlights fundamental physical principles that can provide independent tests of the validity of numerical solutions, commercial software, and computer simulations
- Demonstrates approximation techniques that greatly simplify the mathematics without a substantial decrease in accuracy
- Incorporates a hydrodynamic approach to the acoustics of sound in fluids that provides a uniform methodology for analysis of lumped-element systems and wave propagation
- Emphasizes actual applications as examples of topics explained in the text

This open access textbook, like Rayleigh's classic *Theory of Sound*, focuses on experiments and on approximation techniques rather than mathematical rigor. The second edition has benefited from comments and corrections provided by many acousticians, in particular those who have used the first edition in undergraduate and graduate courses. For example, phasor notation has been added to clearly distinguish complex variables, and there is a new section on radiation from an un baffled piston. Drawing on over 40 years of teaching experience at UCLA, the Naval Postgraduate School, and Penn State, the author presents a uniform methodology, based on hydrodynamic fundamentals for analysis of lumped-element systems and wave propagation that can accommodate dissipative mechanisms and geometrically-complex media. Five chapters on vibration and elastic waves highlight modern applications, including viscoelasticity and resonance techniques for measurement of elastic moduli, while introducing analytical techniques and approximation strategies that are revisited in nine subsequent chapters describing all aspects of generation, transmission, scattering, and reception of waves in fluids. Problems integrate multiple concepts, and several include experimental data to provide experience in choosing optimal strategies for extraction of experimental results and their uncertainties.

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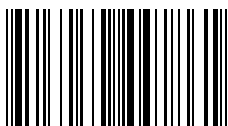
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