Computational Acoustics: Theory and Implementation
David R. Bergman

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DESCRIPTION

Covers the theory and practice of innovative new approaches to modelling acoustic propagation

There are as many types of acoustic phenomena as there are media, from longitudinal pressure waves in a fluid to S and P waves in seismology. This text focuses on the application of computational methods to the fields of linear acoustics. Techniques for solving the linear wave equation in homogeneous medium are explored in depth, as are techniques for modelling wave propagation in inhomogeneous and anisotropic fluid medium from a source and scattering from objects.

Written for both students and working engineers, this book features a unique pedagogical approach to acquainting readers with innovative numerical methods for developing computational procedures for solving problems in acoustics and for understanding linear acoustic propagation and scattering. Chapters follow a consistent format, beginning with a presentation of modelling paradigms, followed by descriptions of numerical methods appropriate to each paradigm. Along the way important implementation issues are discussed and examples are provided, as are exercises and references to suggested readings. Classic methods and approaches are explored throughout, along with comments on modern advances and novel modeling approaches.

• Bridges the gap between theory and implementation, and features examples illustrating the use of the methods described
• Provides complete derivations and explanations of recent research trends in order to provide readers with a deep understanding of novel techniques and methods
• Features a systematic presentation appropriate for advanced students as well as working professionals
• References, suggested reading and fully worked problems are provided throughout

An indispensable learning tool/reference that readers will find useful throughout their academic and professional careers, this book is both a supplemental text for graduate students in physics and engineering interested in acoustics and a valuable working resource for engineers in an array of industries, including defense, medicine, architecture, civil engineering, aerospace, biotech, and more.

💡 ABOUT THE AUTHOR

David R. Bergman, PhD is Owner and Chief Scientist, Exact Solution Scientific Consulting LLC. He has a PhD in physics with a specialization in General Relativity and High Energy Theory. Among other things, he has developed simulations for testing algorithms used in acoustics, modeled electromagnetic remote sensing devices, and modeled underwater and aero-acoustic propagation, acoustic propagation in transducer layers, and performed mechanical vibrational analysis in bio mechanical systems.

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