



Acoustics in Moving Inhomogeneous Media, Second Edition

By Vladimir E. Ostashev, D. Keith Wilson

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Acoustics in Moving Inhomogeneous Media, Second Edition By Vladimir E. Ostashev, D. Keith Wilson

Introduces Systematic Formulations for Use in Acoustic Applications

Acoustics in Moving Inhomogeneous Media, Second Edition offers a uniquely complete and rigorous study of sound propagation and scattering in moving media with deterministic and random inhomogeneities. This study is of great importance in many fields including atmospheric and oceanic acoustics, aeroacoustics, acoustics of turbulent flows, remote sensing of the atmosphere and ocean, noise pollution in the atmosphere, and wave propagation.

Provides Sensible Explanations Using Step-by-Step Practice

The book begins by considering sound propagation through moving media with deterministic inhomogeneities such as vertical profiles of temperature and wind velocity in the atmosphere. It moves on to a new study of sound propagation and scattering in media with random inhomogeneities in adiabatic sound speed, density, and medium velocity. Then this second edition newly sets out state-of-the-art numerical methods for calculating the sound field and its statistical characteristics in moving inhomogeneous media, which is particularly useful for those working in atmospheric acoustics and studying noise pollution. Numerical codes are provided on the book's website

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Covered in three parts, this second edition:

- Incorporates new results developed since the previous edition
- Rewrites and extends the text with formulations of sound propagation and

- scattering in random moving media
- Describes numerical methods for performing calculations involving equations from the first two parts

Acoustics in Moving Inhomogeneous Media, Second Edition serves as the basis of a graduate course in atmospheric and oceanic acoustics or as a rigorous reference work in a wide range of fields such as atmospheric and oceanic acoustics, aeroacoustics, acoustics of turbulent flows, acoustic remote sensing, noise pollution, and wave propagation in deterministic and random media.

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Editorial Review

Review

"... a must-have for experts in the field of outdoor sound propagation seeking for a rigorous reference work. An extended overview of theories and their approximations is provided for predicting sound propagation in moving inhomogeneous media, starting from basic fluid dynamic equations. In addition, a number of relevant numerical techniques for such applications are discussed."

?European Acoustics Association Newsletter, 2015

"... a well-written, illustrated, and comprehensive book on the subject. With up-to-date references, it is a must-have for graduates, engineers or scientists working on atmospheric and oceanic acoustics, aeroacoustics, acoustics of turbulent flows, acoustic remote sensing and noise pollution, and wave propagation in deterministic and random media."

?Didier Dragna, Laboratoire de Mécanique des Fluides et d'Acoustique, Ecole Centrale de Lyon

"The selection of the topics in the book follows modern developments in the acoustics of moving inhomogeneous media."

?Igor Chunchuzov, Oboukhov Institute of Atmospheric Physics

"High-quality textbook of sound propagation in the atmosphere and the ocean, which are complex propagation media (inhomogeneous, moving). The material is extensive on analytical equations and results; this second edition also discusses the techniques to numerically solve these equations."

?S. Cheinet, French German Research Institute of Saint-Louis (ISL)

"An extraordinary and thoughtful book on the subject with deep insight, comprehensive coverage and rich details."

?Ning Xiang, Rensselaer Polytechnic Institute

"It can be expected that **Acoustics in Moving Inhomogeneous Media, Second Edition** will be a standard reference for all scientific studies and applications in the acoustics of fluids."

?Dr. Astrid A. Ziemann, TU Dresden, Chair of Meteorology

"The well written, substantial and rigorous content of the book makes it a must-have reference for outdoor acoustics experts."

?Jens Forssén, Applied Acoustics

"If you are a researcher doing work on acoustics in the ocean or atmosphere, this text is a must-have reference on the theory of acoustic propagation in these media."

?Prof. John A. Colosi, Department of Oceanography, Naval Postgraduate School

"... excellent for PhD students, research staff and academics who wish to develop better understanding of the fundaments of sound wave propagation in fluid with sound speed stratification, in the presence of flow and

turbulence ... presented in a consistent, logical manner which makes this book a useful, self-contain reference on the topic."

?Prof. Kirill V. Horoshenkov, University of Sheffield, UK

"The main strength is the in-depth mathematical description of sound propagation in a moving and inhomogeneous medium. This topic is hardly covered by any other book on the market; the current textbook therefore takes a unique place in the field of sound propagation in the outdoor environment. "

?Timothy Van Renterghem, Ghent University, Belgium

"The book stands as the definitive analytical exposition on sound propagation in moving inhomogeneous media. With its breadth and depth of coverage, its attention to detail, and its authoritative presentation, this book is an essential reference for researchers in the field."

?Michael R. Stinson, National Research Council of Canada

"An obviously well prepared reference for those working to understand, model and predict real world acoustics."

?*Noise Control Engineering Journal*

About the Author

Dr. Vladimir E. Ostashev is a senior research scientist at the Cooperative Institute for Research in Environmental Sciences (CIRES) of the University of Colorado at Boulder (CU) and a government expert for the U.S. Army Engineer Research and Development Center. He received a Ph.D. in physics from the Moscow Physics and Technology Institute, Russia in 1979. Since 1979, he has worked at the Institute of Atmospheric Physics (Moscow, Russia), Acoustics Institute (Moscow, Russia), and New Mexico State University (Las Cruces, NM), and is an associate editor of the *Journal of the Acoustical Society of America* and *JASA Express Letters*.

Dr. D. Keith Wilson is a research physical scientist with the U.S. Army Engineer Research and Development Center (ERDC), in Hanover, NH. He received a Ph.D. in acoustics from the Pennsylvania State University in 1992. Dr. Wilson has been awarded U.S. Army Research and Development Achievement Awards on four occasions and received the U.S. Army Meritorious Civilian Service Award in 2012. He is associate editor of the *Journal of the Acoustical Society of America*, founding editor of *JASA Express Letters*, and a member of the Acoustical Society of America, the Institute for Noise Control Engineering, and the American Meteorological Society.

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