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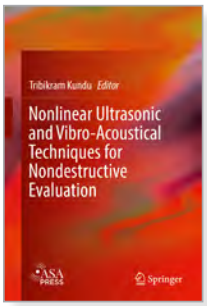


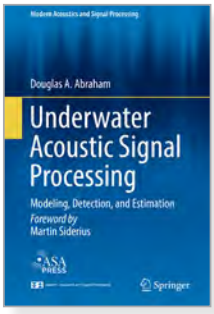
Nonlinear Ultrasonic and Vibro-Acoustical Techniques for Nondestructive Evaluation

Editor: Tribikram Kundu
Copyright: 2019
Publisher: Springer International Publishing
Hardcover: ISBN 978-3-319-94474-6
Edition Number: 1
Number of Pages: XIV, 759
Number of Illustrations and Tables: 138 black and white illustrations, 323 color illustrations
Topics: Engineering Acoustics

- Represents the first book on nonlinear acoustical techniques for NDE applications
- Emphasizes applications of nonlinear acoustical techniques
- Presents the fundamental physics and mathematics behind nonlinear acoustical phenomenon in a simple, easily understood manner
- Covers a variety of popular NDE techniques based on nonlinear acoustics in a single volume

This multi-contributed volume provides a practical, applications-focused introduction to nonlinear acoustical techniques for nondestructive evaluation. Compared to linear techniques, nonlinear acoustical/ultrasonic techniques are much more sensitive to micro-cracks and other types of small distributed damages. Most materials and structures exhibit nonlinear behavior due to the formation of dislocation and micro-cracks from fatigue or other types of repetitive loadings well before detectable macro-cracks are formed. Nondestructive evaluation (NDE) tools that have been developed based on nonlinear acoustical techniques are capable of providing early warnings about the possibility of structural failure before detectable macro-cracks are formed. This book presents the full range of nonlinear acoustical techniques used today for NDE. The expert chapters cover both theoretical and experimental aspects, but always with an eye towards applications. Unlike other titles currently available, which treat nonlinearity as a physics problem and focus on different analytical derivations, the present volume emphasizes NDE applications over detailed analytical derivations. The introductory chapter presents the fundamentals in a manner accessible to anyone with an undergraduate degree in Engineering or Physics and equips the reader with all of the necessary background to understand the remaining chapters. This self-contained volume will be a valuable reference to graduate students through practising researchers in Engineering, Materials Science, and Physics.

About the Editor | Tribikram Kundu is a Professor in the Department of Civil Engineering and Engineering Mechanics at the University of Arizona. Dr. Kundu has made significant and original contributions in both basic and applied research in nondestructive testing (NDT) and structural health monitoring (SHM) by ultrasonic and electromagnetic techniques. His fundamental research interests are monitoring the health of existing and new structures by ultrasonic and other NDT techniques. His research requires knowledge of elastic wave propogation in multi-layered solids, fracture mechanics, computational mechanic, geo- and biomechanics. He has collaborated extensively with international and U.S. scientists. He has spent 28 months in the Department of Biology, J.W. Goethe University, Frankfurt, Germany, first as an Alexander von Humboldt Fellow and then as a Humboldt Research Prize winner. He is a Fellow of the Acoustical Society of America.



Underwater Acoustic Signal Processing

Modeling, Detection, and Estimation

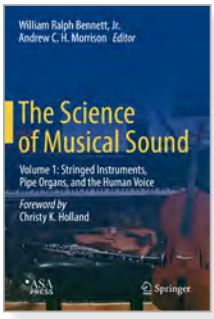
Author: Douglas A. Abraham
Series: Modern Acoustics and Signal Processing
Copyright: 2019
Publisher: Springer International Publishing
Hardcover: ISBN 978-3-319-92981-1
Series ISSN: 2364-4915
Edition Number: 1
Number of Pages: XXXII, 826
Number of Illustrations and Tables: 76 black and white illustrations, 113 color illustrations
Topics: Signal, Image and Speech Processing

- Offers a balanced presentation of the theory and application of signal detection in underwater acoustics
- Addresses a broad audience of practicing sonar engineers, students, and researchers in underwater acoustic signal processing

- Includes relevant background material on underwater acoustics, sonar systems, signal processing, and statistics
- Provides an accessible reference for sonar engineers developing detection algorithms for underwater acoustic sensing systems
- Suitable for use in graduate-level courses in sonar signal processing

This book provides comprehensive coverage of the detection and processing of signals in underwater acoustics. Background material on active and passive sonar systems, underwater acoustics, and statistical signal processing makes the book a self-contained and valuable resource for graduate students, researchers, and active practitioners alike. Signal detection topics span a range of common signal types including signals of known form such as active sonar or communications signals; signals of unknown form, including passive sonar and narrowband signals; and transient signals such as marine mammal vocalizations. This text, along with its companion volume on beamforming, provides a thorough treatment of underwater acoustic signal processing that speaks to its author's broad experience in the field.

About the Author | Douglas A. Abraham received B.S., M.S., and Ph.D. degrees in electrical engineering and an M.S. degree in statistics from the University of Connecticut, Storrs. He has performed basic and applied research in underwater acoustic signal processing at the Naval Undersea Warfare Center (New London, CT), the NATO SACLANT Undersea Research Centre (La Spezia, Italy), and the Applied Research Laboratory at Pennsylvania State University. He presently continues his professional and technical activities as a consultant. Dr. Abraham has also taught at the University of Connecticut as visiting faculty, and managed basic and applied research programs at the Office of Naval Research through an intergovernmental personnel assignment.



The Science of Musical Sound

Volume 1: Stringed Instruments, Pipe Organs,and the Human Voice

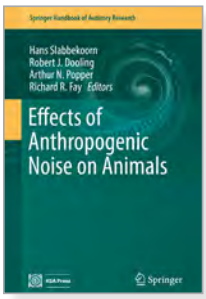
Author: William R. Bennett, Jr.
Editor: Andrew C. H. Morrison
Copyright: 2018
Publisher: Springer International Publishing
Hardcover: ISBN 978-3-319-92794-7
Edition Number: 1
Number of Pages: XXVII, 440
Number of Illustrations and Tables: 185 black and white illustrations, 84 color illustrations
Topics: Acoustics

- Provides unique historical anecdotes relevant to the science
- Includes illustrations and photographs depicting key concepts in novel ways
- Designed for the students who fear math as well as the mathematically inclined
- Written by a world-renowned physicist with a passion for the physics of music
- Covers the basics of oscillations, waves and musical instrument analysis

This textbook is a product of William Bennett's work in developing and teaching a course on the physics of music at Yale University to a diverse audience of musicians and science students in the same class. The book is a culmination of over a decade of teaching the course and weaves together historical descriptions of the physical phenomena with the author's clear interpretations of the most important aspects of the science of music and musical instruments. Many of the historical examples are not found in any other textbook available on the market. As the co-inventor of the Helium-Neon laser, Prof. Bennett's knowledge of physics was world-class. As a professor at one of the most prestigious liberal-arts universities in the world, his appreciation for culture and humanities shines through. The book covers the basics of oscillations, waves and the analysis techniques necessary for understanding how musical instruments work. All types of stringed instruments, pipe organs, and the human voice are covered in this volume. A second volume covers the remaining families of musical instruments as well as selected other topics. Readers without a background in acoustics will enjoy learning the physics of the Science of Musical Sound from a preeminent scientist of the 20th century. Those well versed in acoustics will discover wonderful illustrations and photographs depicting familiar concepts in new and enlightening ways.

About the Author | William R. Bennett, Jr. (1930-2008) was a renowned physicist and professor at Yale University. Prof. Bennett is best known as co-inventor of the Helium-Neon laser. For over ten years, Prof. Bennett taught a widely popular undergraduate course on the physics of music at Yale, upon which this two-volume text is based. Prof. Bennett completed his B.A. at Princeton and received his Ph.D. from Columbia University in 1957. Over the course of his long career, Prof. Bennett was the recipient of numerous awards and honors, and served as master of Yale's Silliman College from 1981-1987.

About the Editor | Andrew Morrison is an Associate Professor at Joliet Junior College in Joliet, IL. He completed his B.S. at the University of Northern Iowa in 2000 and his Ph.D. at Northern Illinois University in 2005. Prof. Morrison is Chair of the Acoustical Society of America Musical Acoustics Technical Committee.



Effects of Anthropogenic Noise on Animals

Editors: Hans Slabbekoorn, Robert Dooling, Arthur N. Popper, and Richard R. Fay

Series: Springer Handbook of Auditory Research

Copyright: 2018

Publisher: Springer-Verlag New York

Hardcover: ISBN 978-1-4939-8572-2

Series ISSN: 0947-2657

Edition Number: 1

Number of Pages: XVIII, 309

Number of Illustrations and Tables: 39 b/w illustrations, 42 color illustrations

Topics: Neurosciences

- Brings together what is known about effects of sound on vertebrates
- Provides a critical introduction to fundamental principles of hearing andacoustics that are needed by all investigators interested in effects of noise on animal
- Chapters focus on taking what is known about basic hearing principles and applying them to the acoustic world of animals

Over the past several years, many investigators interested in the effects of man-made sounds on animals have come to realize that there is much to gain from studying the broader literature on hearing sound and the effects of sound as well as data from the effects on humans. It has also become clear that knowledge of the effects of sound on one group of animals (e.g., birds or frogs) can guide studies on other groups (e.g., marine mammals or fishes) and that a review of all such studies together would be very useful to get a better understanding of the general principles and underlying cochlear and cognitive mechanisms that explain damage, disturbance, and deterrence across taxa. The purpose of this volume, then, is to provide a comprehensive review of the effects of man-made sounds on animals, with the goal of fulfilling two major needs. First, it was thought to be important to bring together data on sound and bioacoustics that have implications across all taxa (including humans) so that such information is generally available to the community of scholars interested in the effects of sound. This is done in Chaps. 2-5. Second, in Chaps. 6-10, the volume brings together what is known about the effects of sound on diverse vertebrate taxa so that investigators with interests in specific groups can learn from the data and experimental approaches from other species. Put another way, having an overview of the similarities and discrepancies among various animal groups and insight into the "how and why" will benefit the overall conceptual understanding, applications in society, and all future research.

About the Editors | Hans Slabbekoorn is an Associate Professor at Leiden University. Robert J. Dooling is a Professor in the Department of Psychology at the University of Maryland. Arthur N. Popper is Professor Emeritus and research Professor in the Department of Biology at the University of Maryland, College Park. Richard R. Fay is Distinguished Research Professor of Psychology at Loyola University Chicago.