### Edited by WARREN P. MASON and R. N. THURSTON

# Physical

## Acoustics

Principles and Methods

VOLUME VII



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### **Physical Acoustics Volume 7 Principles Met**

P. Diehl, E. Fluck, R. Kosfeld

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amplification of acoustic waves in semiconductors by the application of an electric field The final chapter examines how measurements can delineate the Fermi surface of monovalent metals Physicists and engineers will find this book useful

Physical Acoustics V8 Warren P. Mason, 2012-12-02 Physical Acoustics Principles and Methods Volume VIII discusses a number of themes on physical acoustics that are divided into seven chapters Chapter 1 describes the principles and applications of a tool for investigating phonons in dielectric crystals the spin phonon spectrometer. The next chapter discusses the use of ultrasound in investigating Landau quantum oscillations in the presence of a magnetic field and their relation to the strain dependence of the Fermi surface of metals The third chapter focuses on the ultrasonic measurements that are made by pulsing methods with velocities obtained through phase comparison methods and attenuations obtained through comparing pulse heights for successive reflections In Chapter 4 methods for measuring the properties of solids and liquids at very high pressures are described Chapter 5 explores some of the relationships between the thermal equilibrium properties of solids and mechanical properties such as the second and third order elastic constants The sixth chapter discusses the interaction of sound waves with thermal phonons in dielectric crystals and emphasizes the relationship between the various theories proposed and the effect of phonon interactions on the velocity of sound The last chapter describes the applications to metals and rock mechanics of internal friction at low frequencies due to dislocations This book is beneficial to students and physicists conducting work on physical acoustics Physical Acoustics V14 Warren P. Mason, 2012-12-02 Physical Acoustics Principles and Methods Volume XIV is a five chapter text that covers significant studies on acoustic microscopy sound propagation in liquid crystals ultrasonic transducers and ultrasonic flowmeters The opening chapter discusses techniques of acoustic microscopy aberration and resolution performance acoustic lens transfer functions antireflection coatings and both transmission and reflection acoustic microscopy. The following chapter deals with the applications to the states called liquid crystals or anisotropic liquids states in which the material flows but yet has a long range order that makes it macroscopically anisotropic The third chapter focuses on the principles and practical applications of electromagnetic transducers for both surface waves and bulk waves The fourth chapter surveys first the characterization of ultrasonic transducers for materials testing and then compares actual responses to those of an ideal transducer elaborating on the many important factors that affect the results obtained with an ultrasonic testing system The final chapter explains the principles underlying ultrasonic measurements of flow specifically covering eight different categories of ultrasonic flow measurement principles and their industrial applications indicated This book will be of great value to researchers in their fields of electronics technology and applied and engineering mechanics *Ha-based High Tc* Superconductors, 1997 NMR Basic Principles and Progress / NMR Grundlagen und Fortschritte P. Diehl, E. Fluck, R. Kosfeld, 2012-12-06 Nuclear magnetic resonance spectroscopy which has evolved only within the last 20 years has become one of the very important tools in chemistry and physics The literature on its theory and application has grown

immensely and a comprehensive and adequate treatment of all branches by one author or even by several becomes increasingly difficult This series is planned to present articles written by experts working in various fields of nuclear magnetic resonance spectroscopy and will contain review articles as well as progress reports and original work Its main aim however is to fill a gap existing in literature by publishing articles written by specialists which take the reader from the introductory stage to the latest development in the field The editors are grateful to the authors for the time and effort spent in writing the articles and for their invaluable cooperation The Editors Contents o Kanert and M Mehring Static Quadrupole Effects in Disordered Cubic Solids 1 F Noack Nuclear Magnetic Relaxation Spectroscopy 83 Static Quadrupole Effects in Disordered Cubic Solids O KANERT and M MEHRING Physikalisches Institut der Universitat MUnster BRD Contents I Introduction 3 II Fundamentals 4 1 Zero Field Spectra 4 2 High Field Spectra 6 3 Transformation of the Electric Field Gradient Tensor 7 III The Influence of the Quadrupole Perturbation on the NMR Signal 8 1 General Theory 8 a The Free Induction Decay 8 b The Wide Line Signal 11 c The Spin Echo Signal Mededelingen van de Koninklijke Academie voor Wetenschappen, Letteren en Schone Kunsten van België, Klasse der Wetenschappen Koninklijke Academie voor Wetenschappen, Letteren en Schone Kunsten van België. Klasse der Wetenschappen, 1988 **Ultrasonic Treatment of Light Alloy Melts, Second Edition** Georgy I. Eskin, Dmitry G. Eskin, 2014-08-20 Spawned by growing interest in ultrasonic technology and new developments in ultrasonic melt processing the Second Edition of Ultrasonic Treatment of Light Alloy Melts discusses use of ultrasonic melt treatment in direct chill casting shape casting rapid solidification zone refining and more exploring the effects of power ultrasound on melt degassing filtration and refinement in aluminum and magnesium alloys The fully revised and restructured Second Edition Contains new in depth coverage of composite and nanocomposite materials Provides a historical review of the last century of ultrasonic applications to metallurgy Emphasizes the fundamentals mechanisms and applications of ultrasonic melt processing in different light metal technologies Features new chapters on ultrasonic grain refinement refinement of primary solid phases and semi solid processing of billets with nondendritic structure Includes significant updates reflecting results obtained over the past two decades on different scales from laboratory to full scale industrial implementations Complete with many new figures and examples Ultrasonic Treatment of Light Alloy Melts Second Edition delivers a comprehensive treatise on ultrasonic melt processing and cavitation presenting essential guidelines for practical use and further development of the technology **Handbook of Elastic Properties of** Solids, Liquids, and Gases, Four-Volume Set Moises Levy, Henry Bass, Richard Stern, 2000-10-23 Sound waves propagate through galactic space through two dimensional solids through biological systems through normal and dense stars and through everything that surrounds us the earth the sea and the air We use sound to locate objects to identify objects to understand processes going on in nature to communicate and to entertain The elastic properties of materials determine the velocity of sound in them and tell us about their response to stresses something which is very important when we are trying

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Acoustic Emission Wojciech Sikorski, 2012-03-02 Acoustic emission AE is one of the most important non destructive testing NDT methods for materials constructions and machines Acoustic emission is defined as the transient elastic energy that is spontaneously released when materials undergo deformation fracture or both This interdisciplinary book consists of 17 chapters which widely discuss the most important applications of AE method as machinery and civil structures condition assessment fatique and fracture materials research detection of material defects and deformations diagnostics of cutting tools and machine cutting process monitoring of stress and ageing in materials research chemical reactions and phase transitions research and earthquake prediction **Spin Waves and Magnetic Excitations** ,2012-12-02 Modern Problems in Condensed Matter Sciences Volume 22 2 Spin Waves and Magnetic Excitations focuses on the processes methodologies reactions principles and approaches involved in spin waves and magnetic excitations including magnetic systems fluctuations resonance and spin dynamics The selection first elaborates on spin wave resonance in metals excitations in low dimensional magnetic systems and the theory of magnetic excitations in disordered systems Topics include spin waves in ferromagnets with weak fluctuations of the exchange interaction dynamics of propagating excitations models of two dimensional magnetic systems spin wave resonance in bulk metals and standing spin wave resonance in thin films The manuscript then ponders on spin dynamics of amorphous magnets and magnetic excitations in spin glasses including dynamics in reentrant spin glasses dynamics of classical spin glasses spin dynamical theory spin dynamics of locally isotropic materials and effects of dilution The book takes a look at nuclear spin and magnetoelastic excitations and magnetic impuritons in antiferromagnetic dielectric crystals Discussions focus on coherent and incoherent impurity excitations equations of motion and the energy of a magnetoelastic medium magnetoelastic excitations near magnetic orientational phase transitions and the effect of frequency

pulling on the behavior of nuclear spin echo signals The selection is a vital source of data for researchers interested in spin **Acoustics of Wood** Voichita Bucur.2025-02-18 The Third Edition of Acoustics of Wood waves and magnetic excitations offers a comprehensive overview of advanced acoustical techniques for wood characterization and assessment It stands as an authoritative guide on using ultrasound and acoustic emissions to assess and characterize wood s physical and mechanical properties Divided into six parts this extended and updated edition covers a broad spectrum of topics including ultrasonic wave propagation nondestructive testing methods for wood characterization and the innovative use of acoustics in quality assessment of wood products It also explores the acoustic properties vital for musical instruments and the application of acoustics in preserving historically significant art objects and timber structures With chapters on cutting edge topics like artificial intelligence s role in wood acoustics readers are invited to explore the intersection of tradition and technology Targeted at professionals and researchers in materials science engineering and conservation this edition is invaluable for those seeking to deepen their knowledge of wood s acoustic properties Readers with a background in physics or engineering will find the discussions on ultrasonic techniques and acoustic emissions particularly enlightening By bridging theoretical concepts with practical applications this book not only enriches scientific understanding but also opens up new avenues for innovation in wood assessment and preservation Solidification Processing of Metallic Alloys Under External Fields Dmitry G. Eskin, Jiawei Mi, 2018-10-09 This book explores the application of external physical fields to the solidification processing of metallic alloys Leading academics from around the world present comprehensive and critical reviews on state of the art research and discuss possible future directions Major physical fields including electromagnetic electric acoustic and thermal are considered In addition the most advanced synchrotron X ray based real time and in situ studies and numerical modeling methodologies are reviewed and discussed with a special emphasis on their applications to the solidification processes Throughout all chapters are illustrated with both historical and very recent research cases including typical examples of in situ studies modeling and simulation This book contains essential knowledge and information suitable for a wide audience from undergraduate and postgraduate students to academics practicing researchers and engineers in materials metallurgy and manufacturing Encyclopedia of Acoustics Malcolm J. Crocker, 1997 V 1 General linear acoustics nonlinear acoustics and cavitation Aeroacoustics and atmospheric sound underwater sound V 2 Ultrasonics quantum acoustics and physical effects of sound mechanical vibrations and shock statistical methods in acoustics noise its effect and control V 3 Arcitectural acoustics acoustical signal processing physiological acoustics psychological acoustics V 4 Speech communications Music and musical acoustics bioacoustics animal bioacoustics Acoustical measurements and instrumentation transducers Index Acoustical Physics, 1999 <u>Journal of Acoustic Emission</u>, 1988 Ulrich's International **Periodicals Directory** Carolyn Farquhar Ulrich,1998 Physics of the Solid State ,2006

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