

1. Record Nr.	UNINA9910337647803321
Titolo	Nonlinear Ultrasonic and Vibro-Acoustical Techniques for Nondestructive Evaluation [[electronic resource] /] / edited by Tribikram Kundu
Pubbl/distr/stampa	Cham : , : Springer International Publishing : , : Imprint : Springer, , 2019
ISBN	3-319-94476-2
Edizione	[1st ed. 2019.]
Descrizione fisica	1 online resource (761 pages)
Disciplina	620.11274
Soggetti	Acoustical engineering Materials science Acoustics Statistical physics Quality control Reliability Industrial safety Mechanical engineering Engineering Acoustics Characterization and Evaluation of Materials Applications of Nonlinear Dynamics and Chaos Theory Quality Control, Reliability, Safety and Risk Mechanical Engineering
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	List of Contributors -- 1 Fundamentals of Nonlinear Acoustical Techniques and Sideband Peak Count -- 2 Nonlinear Resonant Ultrasound Spectroscopy: Assessing Global Damage -- 3 Modelling and Numerical Simulations in Nonlinear Acoustics Used for Damage Detection -- 4 Structural Damage Detection Based on Nonlinear Acoustics - Application Examples -- 5 Nonlinear and Hysteretic Constitutive Models for Wave Propagation in Solid Media With Cracks and Contacts -- 6 Nonlinear Ultrasonic Techniques for Material

Characterization -- 7 Nonlinear Ultrasonic Responses of Contacting Interfaces -- 8 Nonlinear Acoustic Response of Damage Applied for Diagnostic Imaging -- 9 Nonlinear Guided Waves and Thermal Stresses -- 10 Subharmonic Phased Array for Crack Evaluation (SPACE) -- 11 A Unified Treatment of Nonlinear Viscoelasticity and Non-Equilibrium Dynamics -- 12 Cement-Based Material Characterization Using Nonlinear Single Impact Resonant Acoustic Spectroscopy -- 13 Dynamic Acousto-Elastic Testing -- 14 Time Reversal Acoustics -- 15 Multiscale Quantification of Damage Precursor in Composites -- 16 Anharmonic Interactions of Probing Ultrasonic Waves with the Applied Loads Including Applications Suitable for Structural Health Monitoring -- 17 Noncontact Nonlinear Ultrasonic Wave Modulation for Fatigue Crack and Delamination Detection -- 18 Characterizing Fatigue Cracks Using Active Sensor Networks -- Index.

Sommario/riassunto

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. 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.
