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Phononic crystals and acoustic metamaterials
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properties. Phononic crystals are artificial periodic composite materials consisting... Acoustic metamaterials. Although we introduced PCs by drawing an analogy with electrons in real crystals in which the... Acoustic ...

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Acoustic metamaterials and phononic crystals have some extraordinary physical properties, effective negative parameters, band gaps, negative refraction, etc., extending the acoustic properties of...

(PDF) A Review of Acoustic Metamaterials and Phononic Crystals

Acoustic metamaterials and phononic crystals have some extraordinary physical properties, effective negative parameters, band gaps, negative refraction, etc., extending the acoustic properties of existing materials.

A Review of Acoustic Metamaterials and Phononic Crystals

The emphasis is on acoustic wave propagation phenomena at interfaces such as refraction, especially unusual refractive properties and negative refraction. A thorough discussion of the mechanisms leading to such refractive

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phenomena includes local resonances in metamaterials and scattering in phononic crystals.

Acoustic Metamaterials and Phononic Crystals | SpringerLink

An acoustic metamaterial, sonic crystal, or phononic crystal, is a material designed to control, direct, and manipulate sound waves or phonons in gases, liquids, and solids (crystal lattices). Sound wave control is accomplished through manipulating parameters such as the bulk modulus κ , density ρ , and chirality.

Acoustic metamaterial - Wikipedia

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The emphasis is on acoustic wave propagation phenomena at interfaces such as refraction, especially unusual refractive properties and negative refraction. A thorough discussion of the mechanisms leading to such refractive phenomena includes local resonances in metamaterials and scattering in phononic crystals.

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Phononic crystals and acoustic metamaterials are artificial materials that exhibit extraordinary physical phenomena, functions, and properties in acoustics. Phononic crystals are generally periodic elastic composites or structures designed with local defects for controlling of acoustic wave propagation.

Crystals | Special Issue : Recent Advances in Phononic ...

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The Special Interest Group (SIG) for Acoustic Metamaterials (SIGAM) is concerned with the development of metamaterial devices to create control of sound and elastic wave vibration using subwavelength resonators. The SIG will also maintain an interest in related areas such as phononic crystal, and other structured media as well as treated ...

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Acoustic Metamaterials and Phononic Crystals: Deymier ...

Phononic crystals and acoustic metamaterials : applications to guiding and filtering phenomena and acoustic isolation . By Hocine Larabi. Abstract. Cette thèse est consacrée à l'étude de certaines propriétés nouvelles des cristaux phononiques et des métamatériaux acoustiques. La plupart des simulations numériques a été réalisée ...

Phononic crystals and acoustic metamaterials ...

An overview of the literature on tunable phononic crystals is given. Three of the tuning methods proposed in the literature are described in some details. We also illustrate the new or enhanced functionalities open by the tuning of the phononic crystal properties. These applications include reconfigurable waveguides and tunable superlenses.

Tunable Phononic Crystals and Metamaterials | SpringerLink

Phononics 2019 is the fifth conference dedicated to analysis and manipulation of phonons (vibrations in solids), connecting

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researchers interested in phononic crystals, acoustic/thermal metamaterials, wave propagation in periodic structures, nano-scale phonon transport, and optomechanics and phonon coupling.

Phononics 2019: 5th International Conference on Phononic ...

PHONONICS 2017 is the fourth conference dedicated to analysis and manipulation of phonons (vibrations in solids), connecting researchers interested in phononic crystals, acoustic/thermal metamaterials, wave propagation in periodic structures, nano-scale phonon transport, optomechanics and phonon coupling.

This comprehensive book presents all aspects of acoustic metamaterials and phononic crystals. The emphasis is on acoustic wave propagation phenomena at interfaces such as refraction, especially unusual refractive properties and negative refraction. A thorough discussion of the mechanisms leading to such refractive phenomena includes local resonances in metamaterials and scattering in phononic crystals.

This book presents the most recent theoretical developments and

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numerical/experimental validations of new metamaterials and phononic crystals for the broadband absorption of elastic waves and vibrations in structures. These nine chapters explore many aspects of phononic crystals and acoustic/elastic metamaterials, including sound attenuation/absorption, extraordinary transmission, wave broadband mitigation, wave steering, cloaking via the transformation method, optimization of phononic crystals, and active acoustic metamaterials.

This book provides an in-depth analysis as well as an overview of phononic crystals. This book discusses numerous techniques for the analysis of phononic crystals and covers, among other material, sonic and ultrasonic structures, hypersonic planar structures and their characterization, and novel applications of phononic crystals. This is an ideal book for those working with micro and nanotechnology, MEMS (microelectromechanical systems), and acoustic devices. This book also: Presents an introduction to the fundamentals and properties of phononic crystals Covers simulation techniques for the analysis of phononic crystals Discusses sonic and ultrasonic, hypersonic and planar, and three-dimensional phononic crystal structures Illustrates how phononic crystal structures are being deployed in communication systems and sensing systems

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Book Series provides up-to-date and concise summaries of the present knowledge of interface transmission science. The series' volumes foster the exchange of ideas among scientists interested in different aspects of interface transmission, with each release designed as a text, a reference, and a source. The series serves as an introduction to advanced graduate students, researchers and scientists with little acquaintance with the subject, and is also useful in keeping specialists informed about general progress in the field. A detailed description of mathematical languages is provided in an appendix, enabling readers to find composite system linear transmission properties. All scientists who contribute to these volume have worked in interface transmission in composite systems over many years, providing a thorough and comprehensive understanding of magnonics. Offers a unique approach to magnonics from an interfacial transmission point-of-view Teaches the modern physics of interface transmission, and in particular, magnonics through composite systems Authored and edited by world-leading experts on Interface Transmission

Phononic crystals are artificial periodic structures that can alter efficiently the flow of sound, acoustic waves, or elastic waves. They were introduced about twenty years ago and have gained increasing interest since then, both because of their amazing

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physical properties and because of their potential applications. The topic of phononic crystals stands as the cross-road of physics (condensed matter physics, wave propagation in inhomogeneous and periodic media) and engineering (acoustics, ultrasonics, mechanical engineering, electrical engineering). Phononic crystals cover a wide range of scales, from meter-size periodic structures for sound in air to nanometer-size structures for information processing or thermal phonon control in integrated circuits. Phononic crystals have a definite relation with the topic of photonic crystals in optics. The marriage of phononic and photonic crystals also provides a promising structural basis for enhanced sound and light interaction. As the topic is getting popular, it is nowadays presented and discussed at various international conferences. After the first ten years during which the topic has remained mainly theoretical with a few proof-of-concept demonstrations in the literature, the evolution has been towards applications, instrumentation, and novel designs. The physical explanations for various effects are now well understood and efficient numerical methods and analysis tools have been developed. The book contains a comprehensive set of finite element model (FEM) scripts for solving basic phononic crystal problems. The scripts are short, easy to read, and efficient, allowing the reader to generate for him(her)self band structures for 2D and

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3D phononic crystals, to compute Bloch waves, waveguide and cavity modes, and more.

This comprehensive book presents all aspects of acoustic metamaterials and phononic crystals. The emphasis is on acoustic wave propagation phenomena at interfaces such as refraction, especially unusual refractive properties and negative refraction. A thorough discussion of the mechanisms leading to such refractive phenomena includes local resonances in metamaterials and scattering in phononic crystals.

In the last few decades, metamaterials have revolutionized the ways in which waves are controlled, and applied in physics and practical situations. The extraordinary properties of metamaterials, such as their locally resonant structure with deep subwavelength band gaps and their ranges of frequency where propagation is impossible, have opened the way to a host of applications that were previously unavailable. Acoustic metamaterials have been able to replace traditional treatments in several sectors, due to their better performance in targeted and tunable frequency ranges with strongly reduced dimensions. This is a training book composed of nine chapters written by experts in the field, giving a broad overview of acoustic metamaterials and their uses. The book is divided into three parts, covering the state-of-the-art, the fundamentals and

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the real-life applications of acoustic metamaterials.

This book presents the most recent theoretical developments and numerical/experimental validations of new metamaterials and phononic crystals for the broadband absorption of elastic waves and vibrations in structures. These nine chapters explore many aspects of phononic crystals and acoustic/elastic metamaterials, including sound attenuation/absorption, extraordinary transmission, wave broadband mitigation, wave steering, cloaking via the transformation method, optimization of phononic crystals, and active acoustic metamaterials.

Phononic crystals and acoustic metamaterials are heterogeneous materials that enable manipulation of elastic waves. An important characteristic of these heterogeneous systems is their ability to tailor the propagation of elastic waves due to the existence of band gaps -- frequency ranges of strong wave attenuation. In this Thesis, I report discoveries of three new types of band gaps: i) Band gaps induced by geometric frustration in periodic acoustic channel networks; ii) Band gap induced by high connectivity in periodic beam lattices; and iii) Topological band gaps in gyroscopic phononic crystals that protects one-way edge waves. The investigations presented here shed new light on the rich dynamic properties of phononic

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crystals and acoustic metamaterials, opening avenues for new strategies to control mechanical waves in elastic systems.

This thesis proposes novel designs of phononic crystal plates (PhPs) allowing ultra-wide controllability frequency ranges of guided waves at low frequencies, with promising structural and tunability characteristics. It reports on topology optimization of bi-material-layered (1D) PhPs allowing maximized relative bandgap width (RBW) at target filling fractions and demonstrates multiscale functionality of gradient PhPs. It also introduces a multi-objective topology optimization method for 2D porous PhPs allowing both maximized RBW and in-plane stiffness and addresses the critical role of considering stiffness in designing porous PhPs. The multi-objective topology optimization method is then expanded for designing 2D porous PhPs with deformation induced tunability. A variety of innovative designs are introduced which their maximized broadband RBW is enhanced by, is degraded by or is insensitive to external finite deformation. Not only does this book address the challenges of new topology optimization methods for computational design of phononic crystals; yet, it demonstrated the suitability and applicability of the topological designs by experimental validation. Furthermore, it offers a comprehensive review of the existing

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optimization-based approaches for the design of finite non-periodic acoustic metamaterial structures, acoustic metamaterial lattice structures and acoustic metamaterials under perfect periodicity.

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