

## ACOUSTIC METAMATERIALS AND WAVE CONTROL FRONTIER RESEARCH IN COMPUTATION AND MECHANICS OF MATERIALS

Nov 26, 2020



[Acoustic Metamaterials And Wave Control Frontier Research In Computation And Mechanics Of Materials](#)

Acoustic Metamaterials and Wave Control (Frontier Research in Computation and Mechanics of Materials and Biology, Band 3) | Hu, Gengkai, Zhou, Xiaoming | ISBN: 9789814641685 | Kostenloser Versand für alle Bücher mit Versand und Verkauf durch Amazon.

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Acoustic Metamaterials and Wave Control (Frontier Research in Computation and Mechanics of Materials and Biology) by Xiaoming Zhou (Author), Gengkai Hu (Author) ISBN-13: 978-9814641685

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ACOUSTIC METAMATERIAL DESIGN AND APPLICATIONS BY SHU ZHANG DISSERTATION Submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Mechanical Engineering in the Graduate College of the University of Illinois at Urbana-Champaign, 2010 Urbana, Illinois Doctoral Committee: Assistant Professor Nicholas X. Fang, Chair and Director of Research Professor Jianming ...

[\(PDF\) A Review of Tunable Acoustic Metamaterials](#)

Frontiers of Mechanical Engineering is an international peer-reviewed academic journal sponsored by the Ministry of Education of China. The journal seeks to provide a forum for a broad blend of high-quality academic papers in order to promote rapid communication and exchange between researchers, scientists, and engineers in the field of mechanical engineering.

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It also presents an overview of different media and materials in relation to underwater acoustics: fluids, gas, metals, structural composite materials, and elastomers. In fact, the longitudinal speed of elastomers' sound is close to that of water, and as a consequence, they behave as a transparent medium for the interaction with underwater sound waves. Consequently, the availability of ...

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After their introduction in the field of electromagnetics at the beginning of the century, the principles of metamaterials have been applied for manipulation of elastic and acoustic waves [1,2]. In recent years, they have been the focus of research in an increasingly large community. Many fascinating effects such as cloaking, negative refraction, focusing, or the generation of band gaps have ...

[Fundamentals and Applications of Acoustic Metamaterials](#)

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One of the major research interests in the Frazier Research Group is the spatio-temporal control of phase expression in architected materials in order to adapt the material behavior to suit a variety of conditions. Another of our thrusts lies in bringing small-scale physics (e.g., phase transitions and spinodal decomposition) to architected materials whose tuning parameters are more accessible ...

[Research advances in acoustic metamaterials and metasurface](#)

RESEARCH Acoustic metamaterials: Metamaterials for wave control and manipulation by exploring nonlinearity The development of metamaterials enables to engineer materials with extraordinary features, beyond the traditional limits. In the linear dynamic regime, metamaterials have already enabled a wide range of new functionalities, such as cloaking, super-lenses, and signal filtering. The ...

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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  $\kappa$ , density  $\rho$ , and chirality. They can be engineered to either transmit, or trap and amplify sound waves at ...

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It highlights a comprehensive review of immersed methods in the context of computational fluid and solid mechanics. Most importantly, the appendix includes a complete two-dimensional working Fortran 90 immersed continua code with implicit matrix-free Newton Krylov iteration for compressible fluid and solid systems.

[ACOUSTIC METAMATERIALS GROUP](#)

Metamaterials are artificially engineered composites with designed properties beyond those attainable in nature and with applications in all aspects of materials science. From spatially tailored dielectrics to tunable, dynamic materials properties and unique nonlinear behavior, metamaterial systems have demonstrated tremendous flexibility and functionality in electromagnetic, optical, acoustic ...

[Applied Sciences | Special Issue : Acoustic Metamaterials](#)

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Metamaterials (MM), artificial composite structures with exotic material properties, have emerged as a new frontier of science involving physics, material science, engineering, and chemistry. Recently, MMs have been described in a more broad term as structures with an imposed geometry to fit an intended use.

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Acoustics & Noise Control . Purdue is a renowned center for research and education in Acoustics and Noise Control, focusing on both computational modeling and real-world experimentation. With an array of data-gathering tools, and numerous facilities to conduct experiments, Purdue faculty and students are evaluating the acoustic properties of:

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Hence, metamaterials generate band gaps leading to an impermeability of the material for waves in certain frequency ranges. Other applications are the design of lenses for wave phenomena or waveguides. The chair of vibroacoustics of vehicles and machines conducts research in the area of sound propagation in solids, fluids and coupled systems. The chair developed its own analysis techniques ...

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