1. **Record Nr.**   UNINA9910508444503321

   Titolo   Acoustic Waves in Periodic Structures, Metamaterials, and Porous Media : From Fundamentals to Industrial Applications / / edited by Noé Jiménez, Olga Umnova, Jean-Philippe Groby

   Pubbl/distr/stampa Cham : , : Springer International Publishing : , : Imprint : Springer, , 2021

   ISBN   3-030-84300-9

   Edizione   [1st ed. 2021.]

   Descrizione fisica 1 online resource (455 pages)

   Collana   Topics in Applied Physics, , 1437-0859 ; ; 143

   Disciplina   620.37
                           620.2

   Soggetti   Metamaterials
                           Acoustics
                           Photonic crystals
                           Mathematical physics
                           Acoustical engineering
                           Noise control
                           Photonic Crystals
                           Mathematical Methods in Physics
                           Engineering Acoustics
                           Noise Control

   Lingua di pubblicazione Inglese

   Formato   Materiale a stampa

   Livello bibliografico Monografia

   Nota di contenuto   Part I Wave propagation in periodic and structured media -- Periodic structures and the plane wave expansion method -- Introduction to multiple scattering theory for scalar waves -- Sound wave propagation in sonic crystals -- The transfer matrix method to model one-dimensional phononic crystals and metamaterials -- Part II Wave propagation in absorbing metamaterials and porous media -- Acoustic metamaterial absorbers -- Acoustic wave propagation in viscothermal fluids -- Nonlocal dynamic homogenization of uid-saturated metamaterials -- Numerical methods for modelling and simulation porous materials -- Part III Industrial applications of porous media and acoustic metamaterials -- Industrial applications I: A general

Perspective -- Industrial Applications II: Building industry -- Industrial Applications III: Automotive industry -- Industrial Applications IV: Aeronautics industry.

Sommario/riassunto	This book delivers a comprehensive and up-to-date treatment of practical applications of metamaterials, structured media, and conventional porous materials. With increasing levels of urbanization, a growing demand for motorized transport, and inefficient urban planning, environmental noise exposure is rapidly becoming a pressing societal and health concern. Phononic and sonic crystals, acoustic metamaterials, and metasurfaces can revolutionize noise and vibration control and, in many cases, replace traditional porous materials for these applications. In this collection of contributed chapters, a group of international researchers reviews the essentials of acoustic wave propagation in metamaterials and porous absorbers with viscothermal losses, as well as the most recent advances in the design of acoustic metamaterial absorbers. The book features a detailed theoretical introduction describing commonly used modelling techniques such as plane wave expansion, multiple scattering theory, and the transfer matrix method. The following chapters give a detailed consideration of acoustic wave propagation in viscothermal fluids and porous media, and the extension of this theory to non-local models for fluid saturated metamaterials, along with a description of the relevant numerical methods. Finally, the book reviews a range of practical industrial applications, making it especially attractive as a white book targeted at the building, automotive, and aeronautic industries.