

Physics and Applications of Negative Refractive Index Materials

By S. Anantha Ramakrishna, Tomasz M. Grzegorczyk

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Ever since the first experimental demonstration was reported in 2000, the interest in metamaterials and left-handed media that exhibit a negative refractive index has increased exponentially. Surveying this explosive growth, **Physics and Applications of Negative Refractive Index Materials** covers the fundamental physical principles and emerging engineering applications of structured electromagnetic metamaterials that yield a negative refraction as well as other unexpected physical properties. It provides detailed explanations on the history, development, and main achievements of metamaterials.

Making it easy to access relevant, up-to-date information on the field, the authors bring together the most important and influential papers related to metamaterials. They present the principles of negative refraction and compare the uniqueness of novel metamaterials with other media that exhibit similar properties. The book discusses the design, optimization, and testing of structured metamaterials as well as applications of metamaterials at frequencies ranging from radio wave to optical. It also explores novel concepts and phenomena, such as the perfect lens for super-resolution imaging, hyper lenses that couple the near-field to radiative modes, electromagnetic cloaking and invisibility, and near-field optical imaging.

Connecting theoretical ideas to recent experimental techniques and results, this state-of-the-art book enables an understanding of the basic principles of and research contributions to metamaterials with negative refractive index and their electromagnetic properties.

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Editorial Review

Review

The book has been very carefully produced, with the mathematics and physics accurately represented. … This is an excellent introduction to a fascinating class of materials. All aspects of the interaction of negative refractive index materials with electromagnetic materials are covered, and detailed theoretical derivations are linked with clear discussions of practical issues. It is a book that will be of value both to a newcomer to the field and as a concise reference work for the more experienced researcher.
?Dr. A.H. Harker, University College London, in *Contemporary Physics*, 2010, 1

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