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An analogy between a liquid crystal hyperbolic metamaterial and the Milne universe - Fernando Moraes**Metamaterial-based wideband low-profile mushroom antenna WWB17: RF SAW Devices I Made a Real-Life Invisibility Cloak! Watch My Hand Disappear With My Homemade Rochester Cloak! Demo acoustic metamaterial: acoustic enclosure **Metamaterial Mechanisms (IJST'16) Acoustic Metamaterials with Steve Cummer Smart materials (5 of 5): Invisibility Cloak **Metamaterials Explained Simply and Visually Listen to an acoustic metamaterial ... Berkeley Researchers Create an Invisibility Cloak Acoustic Metamaterials******

Federico Capasso on the quantum cascade laser**Martin Wegener plenary talk PW13: Three-dimensional Metamaterials Made By Direct Laser Writing Intelligent Metamaterials for Enhanced MRI **Lecture 26: History of Acoustic Metamaterials PercEvite: Sense and Avoid technologies for small drones *Physics and the Games: a winning formula*****

Ask A Fixer: What You Should Know about Converting to Material Ledger**Lecture III - People and Tomorrow's (Too Small) World **Sumana Harihareswara - HTTP Can Do That?! - PyCon 2016 Low-Profile Natural And Metamaterial****

Presents recent progress in low-profile natural and metamaterial antennas. This book presents the full range of low-profile antennas that use novel elements and take advantage of new concepts in antenna implementation, including metamaterials. Typically formed by constructing lattices of simple elements, metamaterials possess electromagnetic properties not found in naturally occurring materials, and show great promise in ...

Low-Profile Natural and Metamaterial Antennas | Wiley---

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Low-profile Natural and Metamaterial Antennas on Apple Books

Offers comprehensive coverage of both metamaterials and natural materials for low-profile antennas Written by an internationally-recognized expert in the field of low-profile antennas Depicts actual high-performance low-profile antennas for the antenna engineer Draws on classroom-tested material in graduate courses and short courses over the past 20 years Low-Profile Natural and Metamaterial Antennas is a must-have reference book for advanced undergraduate and graduate level students as well ...

Low-profile Natural and Metamaterial Antennas: Analysis---

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Low-profile Natural and Metamaterial Antennas: Analysis---

Low-profile Natural and Metamaterial Antennas: Analysis Methods and Applications (IEEE Press Series on Electromagnetic Wave Theory) eBook: Hisamatsu Nakano: Amazon.co.uk: Kindle Store

Low-profile Natural and Metamaterial Antennas: Analysis---

Draws on classroom-tested material in graduate courses and short courses over the past 20 years Low-Profile Natural and Metamaterial Antennas is a must-have reference book for advanced undergraduate and graduate level students as well as antenna engineers interested in low-profile antenna design theory.

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Low-profile natural and metamaterial antennas - analysis---

nakano presents recent progress in low profile natural and metamaterial antennas this book presents the full range of low profile antennas that use novel elements and take advantage of new concepts in abstract metamaterials are materials typically engineered with novel or artificial structures to produce electromagnetic properties that are

Lowprofile Natural And Metamaterial Antennas Analysis---

in low profile natural and metamaterial antennas this book presents the full range of low profile antennas that use novel elements and take advantage of new concepts in antenna implementation including metamaterials typically formed by constructing lattices of simple elements metamaterials possess electromagnetic properties not found

Lowprofile Natural And Metamaterial Antennas Analysis---

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Low-Profile Natural and Metamaterial Antennas - Hisamatsu---

Cool wrappings: roll-to-roll glass-polymer metamaterial cools 24/7. (Courtesy: Glenn J Asakawa/University of Colorado Boulder) A new metamaterial film provides cooling without needing a power input. Made out of glass microspheres, polymer and silver, the material uses passive radiative cooling to dissipate heat from the object it covers.

New metamaterial enhances natural cooling without power---

low profile natural and metamaterial antennas is a must have reference book for advanced undergraduate and graduate level students as well as antenna engineers interested in low profile antenna design

20 Best Book Lowprofile Natural And Metamaterial Antennas---

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Presents recent progress in low-profile natural and metamaterial antennas This book presents the full range of low-profile antennas that use novel elements and take advantage of new concepts in antenna implementation, including metamaterials. Typically formed by constructing lattices of simple elements, metamaterials possess electromagnetic properties not found in naturally occurring materials, and show great promise in a number of low-profile antenna implementations. Introductory chapters define various natural and metamaterial-based antennas and provide the fundamentals of writing computer programs based on the method of moments (MoM) and the finite-difference time-domain method (FDTD). Chapters then discuss low-profile natural antennas classified into base station antennas, mobile card antennas, beam-forming antennas, and satellite-satellite and earth-satellite communications antennas. Final chapters look at various properties of low-profile metamaterial-based antennas, revealing the strengths and limitations of the metamaterial-based straight line antenna (metaline antenna), metamaterial-based loop antenna (metaloop), open metaloop antenna, the effects of counter dual-band CP radiation, and more. Offers comprehensive coverage of both metamaterials and natural materials for low-profile antennas Written by an internationally-recognized expert in the field of low-profile antennas Depicts actual high-performance low-profile antennas for the antenna engineer Draws on classroom-tested material in graduate courses and short courses over the past 20 years Low-Profile Natural and Metamaterial Antennas is a must-have reference book for advanced undergraduate and graduate level students as well as antenna engineers interested in low-profile antenna design theory.

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This book discusses bulk solids that derive their mechanical properties not from those of their base materials, but from their designed microstructures. Focusing on the negative mechanical properties, it addresses topics that reveal the counter-intuitive nature of solids, specifically the negativity of properties that are commonly positive, such as negative bulk modulus, negative compressibility, negative hydroexpansion, negative thermal expansion, negative stiffness phase, and negative Poisson's ratio. These topics are significant not only due to the curiosity they have sparked, but also because of the possibility of designing materials and structures that can behave in ways that are not normally expected in conventional solids, and as such, of materials that can outperform solids and structures made from conventional materials. The book includes illustrations to facilitate learning, and, where appropriate, reference tables. The presentation is didactic, starting with simple cases, followed by increasingly complex ones. It provides a solid foundation for graduate students, and a valuable resource for practicing materials engineers seeking to develop novel materials through the judicious design of microstructures and their corresponding mechanisms.

This book commemorates four decades of research by Professor Magdy F. Iskander (Life Fellow IEEE) on materials and devices for the radiation, propagation, scattering, and applications of electromagnetic waves, chiefly in the MHz-THz frequency range as well on electromagnetics education. This synopsis of applied electromagnetics, stemming from the life and times of just one person, is meant to inspire junior researchers and reinvigorate mid-level researchers in the electromagnetics community. The authors of this book are internationally known researchers, including 14 IEEE fellows, who highlight interesting research and new directions in theoretical, experimental, and applied electromagnetics.

This book presents selected research papers on current developments in the fields of soft computing and signal processing from the Third International Conference on Soft Computing and Signal Processing (ICSCSP 2020). The book covers topics such as soft sets, rough sets, fuzzy logic, neural networks, genetic algorithms and machine learning and discusses various aspects of these topics, e.g., technological considerations, product implementation and application issues.

One of the most methodical treatments of electromagnetic wave propagation, radiation, and scattering—including new applications and ideas Presented in two parts, this book takes an analytical approach on the subject and emphasizes new ideas and applications used today. Part one covers fundamentals of electromagnetic wave propagation, radiation, and scattering. It provides ample end-of-chapter problems and offers a 90-page solution manual to help readers check and comprehend their work. The second part of the book explores up-to-date applications of electromagnetic waves—including radiometry, geophysical remote sensing and imaging, and biomedical and signal processing applications. Written by a world renowned authority in the field of electromagnetic research, this new edition of Electromagnetic Wave Propagation, Radiation, and Scattering: From Fundamentals to Applications presents detailed applications with useful appendices, including mathematical formulas, Airy function, Abel's equation, Hilbert transform, and Riemann surfaces. The book also features newly revised material that focuses on the following topics: Statistical wave theories—which have been extensively applied to topics such as geophysical remote sensing, bio-electromagnetics, bio-optics, and bio-ultrasound imaging Integration of several distinct yet related disciplines, such as statistical wave theories, communications, signal processing, and time reversal imaging New phenomena of multiple scattering, such as coherent scattering and memory effects Multiphysics applications that combine theories for different physical phenomena, such as seismic coda waves, stochastic wave theory, heat diffusion, and temperature rise in biological and other media Metamaterials and solitons in optical fibers, nonlinear phenomena, and porous media Primarily a textbook for graduate courses in electrical engineering, Electromagnetic Wave Propagation, Radiation, and Scattering is also ideal for graduate students in bioengineering, geophysics, ocean engineering, and geophysical remote sensing. The book is also a useful reference for engineers and scientists working in fields such as geophysical remote sensing, bio-medical engineering in optics and ultrasound, and new materials and integration with signal processing.

Substrate-Integrated Millimeter-Wave Antennas for Next-Generation Communication and Radar Systems The first and only comprehensive text on substrate-integrated mmW antenna technology, state-of-the-art antenna design, and emerging wireless applications Substrate-Integrated Millimeter-Wave Antennas for Next-Generation Communication and Radar Systems elaborates the most important topics related to revolutionary millimeter-wave (mmW) technology. Following a clear description of fundamental concepts including substrate-integrated waveguides and loss analysis, the text treats key design methods, prototyping techniques, and experimental setup and testing. The authors also highlight applications of mmW antennas in 5G wireless communication and next-generation radar systems. Readers are prepared to put techniques into practice through practical discussions of how to set up testing for impedance matching, radiation patterns, gain from 24GHz up to 325 GHz, and more. This book will bring readers state-of-the-art designs and recent progress in substrate-integrated mmW antennas for emerging wireless applications. Substrate-Integrated Millimeter-Wave Antennas for Next-Generation Communication and Radar Systems is the first comprehensive text on the topic, allowing readers to quickly master mmW technology. This book: Introduces basic concepts such as metamaterials Huygens's surface, zero-index structures, and pattern synthesis Describes prototyping in the form of fabrication based on printed-circuit-board, low-temperature-co-fired-ceramic and micromachining Explores applications for next-generation radar and imaging systems such as 24-GHz and 77-GHz vehicular radar systems Elaborates design methods including waveguide-based feeding network, three-dimensional feeding structure, dielectric loaded aperture antenna element, and low-sidelobe synthesis The mmW is one of today's most important emerging technologies. This book provides graduate students, researchers, and engineers with the knowledge they need to deploy mmW systems and develop new antenna designs with low cost, low loss, and low complexity.

Describes applications of time-domain EM reciprocity and the Cagniard-deHoop technique to achieve solutions to fundamental antenna radiation and scattering problems This book offers an account of applications of the time-domain electromagnetic (TD EM) reciprocity theorem for solving selected problems of antenna theory. It focuses on the development of both TD numerical schemes and analytical methodologies suitable for analyzing TD EM wave fields associated with fundamental antenna topologies. Time-Domain Electromagnetic Reciprocity in Antenna Modeling begins by applying the reciprocity theorem to formulate a fundamentally new TD integral equation technique – the Cagniard-deHoop method of moments (CdH-MoM) – regarding the pulsed EM scattering and radiation from a thin-wire antenna. Subsequent chapters explore the use of TD EM reciprocity to evaluate the impact of a scatterer and a lumped load on the performance of wire antennas and propose a straightforward methodology for incorporating ohmic loss in the introduced solution methodology. Other topics covered in the book include the pulsed EM field coupling to transmission lines, formulation of the CdH-MoM concerning planar antennas, and more. In addition, the book is supplemented with simple MATLAB code implementations, so that readers can test EM reciprocity by conducting (numerical) experiments. In addition, this text: Applies the thin-sheet boundary conditions to incorporate dielectric, conductive and plasmonic properties of planar antennas Provides illustrative numerical examples that validates the described methodologies Presents analyzed problems at a fundamental level so that readers can fully grasp the underlying principles of solution methodologies Includes appendices to supplement material in the book Time-Domain Electromagnetic Reciprocity in Antenna Modeling is an excellent book for researchers and professors in EM modeling and for applied researchers in the industry.

A comprehensive survey of boundary conditions as applied in antenna and microwave engineering, material physics, optics, and general electromagnetics research. Boundary conditions are essential for determining electromagnetic problems. Working with engineering problems, they provide analytic assistance in mathematical handling of electromagnetic structures, and offer synthetic help for designing new electromagnetic structures. Boundary Conditions in Electromagnetics describes the most-general boundary conditions restricted by linearity and locality, and analyzes basic plane-wave reflection and matching problems associated to a planar boundary in a simple-isotropic medium. This comprehensive text first introduces known special cases of particular familiar forms of boundary conditions — perfect electromagnetic conductor, impedance, and DB boundaries — and then examines various general forms of boundary conditions. Subsequent chapters discuss sesquilinear boundary conditions and practical computations on wave scattering by objects defined by various boundary conditions. The practical applications of less-common boundary conditions, such as for metamaterial and metasurface engineering, are referred to throughout the text. This book: Describes the mathematical analysis of fields associated to given boundary conditions Provides examples of how boundary conditions affect the scattering properties of a particle Contains ample in-chapter exercises and solutions, complete references, and a detailed index Includes appendices containing electromagnetic formulas, Gibbsian 3D dyadics, and four-dimensional formalism Boundary Conditions in Electromagnetics is an authoritative text for electrical engineers and physicists working in electromagnetics research, graduate or post-

graduate students studying electromagnetics, and advanced readers interested in electromagnetic theory.

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