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Electromagnetic (EM) wave scattering is of fundamental importance to antenna and radar design engineering, and the increasing interest in metamaterials has created a need for new approaches to solving scattering problems for characterizing engineered media. This book lays the theoretical foundation for new computer programs in computational electromagnetics (CEM) and meets the need of today's researchers. This book represents over 30 years of the author's experience teaching this topic, with extensive lectures notes expanded to include advanced concepts and mathematical solutions to cover modern effects on metamaterials and related advanced complexities. Problems and solutions at the end of each chapter help to reinforce concepts and highlight applications. This is an ideal text for advanced graduate students and researchers in EM and applied physics.

This book summarises recent developments and enhancements in post-processing techniques that increase the quality and effectiveness of modern antenna measurements. Recent advances in near to far field transformation algorithms for enhancing measurement accuracy in the presence of different common error sources are explained in detail. Developments in techniques for reducing the effect of echoes, noise, and leakage, and to reduce acquisition time, are also explored. The book is written by a range of experts from academia and industry. It explains and illustrates by practical examples several very efficient source reconstruction techniques, and the use of modal and spatial filtering techniques to understand intimate features of measured antennas. It explains phase recovery techniques and demonstrates how combining simulations and measurements can allow for more accurate and faster antenna designs. The book is a useful resource for academics and industry professionals interested in both antenna measurement and design. ested in both antenna measurement and design.

This book constitutes the proceedings of the 16th IFIP International Conference on Wired/Wireless Internet Communications, WWIC 2018, held in Boston, MA, USA, in June 2018. The 26 regular papers presented in this volume were carefully reviewed and selected from 42 submissions. They were organized in topical sections named: IoT and sensor networks; learning-based networking; network deployment; network security; aerial networks; and vehicular and content delivery networks.

Metamaterials and plasmonics are cross-disciplinary fields that are emerging into the mainstream of many scientific areas. Examples of scientific and technical fields which are concerned are electrical engineering, micro- and nanotechnology, microwave engineering, optics, optoelectronics, and semiconductor technologies. In plasmonics, the interplay between propagating electromagnetic waves and free-electron oscillations in materials are exploited to create new components and applications. On the other hand, metamaterials refer to artificial composites in which small artificial elements, through their collective interaction, creates a desired and unexpected macroscopic response function that is not present in the constituent materials. This book charts the state of the art of these fields. In May 2008, world-leading experts in metamaterials and plasmonics gathered into a NATO Advanced Research Workshop in Marrakech, Morocco. The present book contains extended versions of 22 of the presentations held in the workshop, covering the general aspects of the field, as well as design and modelling questions of plasmonics and metamaterials, fabrication issues, and applications like absorbers and antennas.

ICTON addresses applications of transparent and all optical technologies in telecommunication networks, systems, and components ICTON topics are well balanced between basic optics and network engineering Interactions between those two groups of professionals are a valuable merit of conference ICTON combines high level invited talks with carefully selected regular submissions

Wireless communications has made a huge leap during the past two decades. The multiple-

input-multiple-output (MIMO) technology was proposed in the 1990's as a viable solution that can overcome the data rate limit experienced by single-input-single-output (SISO) systems. This resource is focused on printed MIMO antenna system design. Printed antennas are widely used in mobile and handheld terminals due to their conformity with the device, low cost, good integration within the device elements and mechanical parts, as well as ease of fabrication. A perfect design companion for practicing engineers, this book provides full design examples from literature, along with detailed illustrations for the various antenna geometries. This resource overviews the various applications that currently depend on printed MIMO antennas, and provides design guidelines and remarks throughout the book for guidance.

If you are involved in designing and developing small antennas, this complete cutting-edge guide covers everything you need to know. From fundamentals and basic theory to design optimization, evaluation, measurements and simulation techniques, all the essential information is included. You will also get many practical examples from a range of wireless systems, whilst a glossary is provided to bring you up to speed on the latest terminology. A wide variety of small antennas is covered, and design and practice steps are described for each type: electrically small, functionally small, physically constrained small and physically small. Whether you are a professional in industry, a researcher, or a graduate student, this is your essential guide to small antennas.

AntennasFrom Theory to PracticeJohn Wiley & Sons

This book constitutes the refereed proceedings of the 10th International Conference on Wired / Wireless Internet Communications, WWIC, held in Santorini island, Greece during June 6-8, 2012. The 23 revised full papers and 6 short papers presented were carefully reviewed and selected from 50 submissions. The papers are organized in six thematically-distinct technical sessions, covering the following major topics: virtual networks and clouds, multimedia systems, wireless sensor networks and localization, delay-tolerant and opportunistic networks, handover techniques and channel access, and ad hoc networks

Presents introductory information and trivia on a wide range of subjects, including the animal kingdom, the environment, geography, science, sports, popular culture, and United States history.

Microstrip patch antennas have become the favorite of antenna designers because of their versatility and having the advantages of planar profile, ease of fabrication, compatibility with integrated circuit technology, and conformability with a shaped surface. There is a need for graduate students and practicing engineers to gain an in depth understanding of this subject. The first edition of this book, published in 2011, was written with this purpose in mind. This second edition contains approximately one third new materials. The authors, Prof KF Lee, Prof KM Luk and Dr HW Lai, have all made significant contributions in the field. Prof Lee and Prof Luk are IEEE Fellows. Prof Lee was the recipient of the 2009 John Kraus Antenna Award of the IEEE Antennas and Propagation Society while Prof. Luk receives the same award in 2017, both in recognition of their contributions to wideband microstrip antennas.

This book presents recent and important developments in the field of terahertz radiation, with a particular focus on pulsed terahertz radiation. Situated in the gap

between electronics and optics, the terahertz frequency range of the electro-magnetic spectrum has long been neglected by scientists and engineers due to a lack of efficient and affordable terahertz sources and detectors. The advent of femtosecond lasers in the 1980s and photoconductive switches in 1984 have made the terahertz gap accessible, while at the same time advances in electronics and optics have made it narrower. Research activities in terahertz frequencies have intensified dramatically since that time, funding has increased by a factor of 100 in the last decade. The reviews by leading experts are of interest to researchers and engineers as well as advanced students.

This completely revised and expanded edition of an Artech House classic Polarization in Electromagnetic Systems presents the principles of polarization as applied to electromagnetic systems. This edition emphasizes the concepts needed for functional aspects of systems calculations and device evaluation. Readers find up-to-date coverage of applications in wireless communications. The fundamentals of polarization are explained, including the principles of wave polarization along with their mathematical representations. This book explores polarized, partially polarized waves, and unpolarized waves. The second part of the book addresses applications of polarization to practical systems. Antenna polarization is covered in detail, including omnidirectional, directional, and broadband antennas with emphasis on antennas for generating linear and circular polarization for each antenna type. This book provides detailed coverage of wave interaction with an antenna and dual-polarized systems. Additional topics covered in this edition include propagation through depolarizing media, polarization in wireless communication systems, including polarization diversity and polarization measurements. This hands-on resource provides a clear exposition on the understanding of polarization principles and evaluation of the performance of electromagnetic systems.

Offers the only consolidated reference on radar polarimetry design, analysis, and application and explains the most recent development in polarization system design and application. Illustrated with 150 figures, 10 tablets, and 9 full-color SAR images.

GEMCCon is an international conference with a local focus The aim is to bring together EMC and SIPI practitioners and engineers from a region to share their knowledge and expertise It is also a fantastic opportunity for members outside that region to meet colleagues to develop collaborations that widens and strengthens the global community It is our pleasure to welcome you to Bangalore, the Garden City of India, for the 5th edition of the IEEE Global Electromagnetic Compatibility Conference (GEMCCON), to be held from 6 to 8 November 2019 Bangalore, officially known as Bengaluru, is the capital city of the South Indian state of Karnataka It is located in on the Deccan Plateau at an elevation of over 900 m above sea level Bangalore is the major center of India s IT industry, and is popularly known as the Silicon Valley of India

This important new volume is the first in a series that will report on advances and applications in the modern development of electromagnetics. This series will serve as an international forum for the publication of state of the art review articles on new theories, methodologies and computational techniques, and interpretations of both theoretical and experimental results. The

series' wide scope covers the spectrum of related topics from electrostatics to optical frequencies and beyond. It constitutes an invaluable reference for scientists and engineers in the electromagnetics profession and will act as a source of new topics for researchers in electromagnetics. This first volume includes papers on electromagnetics as applied to complex resistivity of the earth, medical treatments, remote sensing, and more.

This is the first book on constructive methods for, and applications of orthogonal polynomials, and the first available collection of relevant Matlab codes. The book begins with a concise introduction to the theory of polynomials orthogonal on the real line (or a portion thereof), relative to a positive measure of integration. Topics which are particularly relevant to computation are emphasized. The second chapter develops computational methods for generating the coefficients in the basic three-term recurrence relation. The methods are of two kinds: moment-based methods and discretization methods. The former are provided with a detailed sensitivity analysis. Other topics addressed concern Cauchy integrals of orthogonal polynomials and their computation, a new discussion of modification algorithms, and the generation of Sobolev orthogonal polynomials. The final chapter deals with selected applications: the numerical evaluation of integrals, especially by Gauss-type quadrature methods, polynomial least squares approximation, moment-preserving spline approximation, and the summation of slowly convergent series. Detailed historic and bibliographic notes are appended to each chapter. The book will be of interest not only to mathematicians and numerical analysts, but also to a wide clientele of scientists and engineers who perceive a need for applying orthogonal polynomials.

+ FREE BOOK Buy this book and get BOOK for FREE Drawing is a beautiful art for a number of reasons. First of all, it allows you to produce amazing drawing, which people will admire. Of course, it all depends on the subject you choose - the more interesting the subject is, the more praise it will earn. If you want to learn to draw awesome drawings, why not thinking about drawing dragons? Dragons from the movie How to Train Your Dragon look amazing. They are looking both cute and scary at the same time. The best thing about this is that it is your choice whether the dragon is going to be scary or not. That is the fact that makes drawing dragons a wonderful practice, which can boost your creativity. Once you learn how to draw dragons, you will be able to draw many similar characters, both mythical and from real life. You will be able to draw animals that are of similar shape as dragons from this movie. A great thing about drawing movie characters is that you can do this together with your children, who are probably fans of this movie. Together, you can learn to draw and unleash your creativity, creating your own characters if you wish. Drawing can have a lot of benefits on the mind and intelligence of your children, so you should think about bringing this art closer to them. Probably there is no better way to make your kids familiar with drawing that teaching them to draw their favorite characters. Luckily for you, learning how to draw dragons and teaching your kids how to do it, is not hard. At least it's not hard when you have the right help. This book will make you feel happy while learning how to draw, because it contains step by step guides on how to draw characters from your favorite animated movie, How to Train Your Dragon. Here is preview of what you'll learn: Boost Your Child's Creativity Through Drawings Your Dragon 1-Baby Gronckle Your Dragon 2-Toothless (Night Fury) Your Dragon 3-Terrible Terror Your Dragon 5 - Stormfly Your Dragon 6-Toothless (Night Fury 3) Enjoy reading and practicing, and do not forget to receive your FREE BONUS BOOK All the instructions you will find at the end of the book. Good luck!

A beautiful and informative alphabet book created in association with the National Galley - perfect for children and adults alike. See the sights of the National Gallery as never before - through the eyes of award-winning illustrator Paul Thurlby. From Da Vinci to Monet, from medieval masters to the French Impressionists, come on a inspiring tour of one of the world's most-visited museums. Enjoy masterpieces like Van Gogh's Sunflowers and Constable's The

Hay Wain as well discovering some lesser known gems. This unique book is packed to bursting with the world's greatest paintings and the stories behind them. Praise for Paul Thurlby's Numbers: 'Stunning collection.' Guardian 'Paul Thurlby's prints are so ludicrously beautiful that I am seriously tempted to blow the budget, order the whole lot and paper a wall with them.' India Knight, journalist and author

"This thoroughly revised edition of the Artech House classic, Phased Array Antenna Handbook, offers the most up-to-date and broadest view of array antennas and systems. Supported with over 350 equations and more than 270 illustrations, the book offers complete design details that allow practitioners to size an array system with speed and confidence."--BOOK JACKET.Title Summary field provided by Blackwell North America, Inc. All Rights Reserved

This classic Bible storybook connects kids to God's Word through the essential stories of faith told in simple, engaging ways they can understand--and now has a new cover and updated callouts. God's Story for Me Bible is packed with 104 essential Bible stories, each illustrated with inviting pictures that make God's Word come alive. Parents, grandparents, and teachers will be able to guide their preschool-aged children to a deeper understanding of God's Word with interactive discussion starters that help explain why God wants us to know His story and how it connects to each child's life. The Bible storybook also includes a presentation page for easy gift giving and fun stickers for children to personalize their books. God's Story for Me Bible will help children draw closer to Jesus and spark a lifelong love for the Bible.

This book constitutes the joint refereed proceedings of the 17th International Conference on Next Generation Wired/Wireless Advanced Networks and Systems, NEW2AN 2017, the 10th Conference on Internet of Things and Smart Spaces, ruSMART 2017. The 71 revised full papers presented were carefully reviewed and selected from 202 submissions. The papers of NEW2AN focus on advanced wireless networking and applications; lower-layer communication enablers; novel and innovative approaches to performance and efficiency analysis of ad-hoc and machine-type systems; employed game-theoretical formulations, Markov chain models, and advanced queuing theory; grapheme and other emerging material, photonics and optics; generation and processing of signals; and business aspects. The ruSMART papers deal with fully-customized applications and services. The NsCC Workshop papers capture the current state-of-the-art in the field of molecular a nd nanoscale communications such as information, communication and network theoretical analysis of molecular and nanonetwork, mobility in molecular and nanonetworks; novel and practical communication protocols; routing schemes and architectures; design/engineering/evaluation of molecular and nonoscale communication systems; potential applications and interconnections to the Internet (e.g. the Internet of Nano Things).

The main objective of this book is to present novel radio frequency (RF) antennas for 5G, IOT, and medical applications. The book is divided into four sections that present the main topics of radio frequency antennas. The rapid growth in development of cellular wireless communication systems over the last twenty years has resulted in most of world population owning smartphones, smart watches, I-pads, and other RF communication devices. Efficient compact wideband antennas are crucial in RF communication devices. This book presents information on planar antennas, cavity antennas, Vivaldi antennas, phased arrays, MIMO antennas, beamforming phased array reconfigurable Pabry-Perot cavity antennas, and time modulated linear array. This book discusses innovation in ultra-wideband (UWB) technologies and systems. Divided into four sections, the volume introduces UWB technologies and RF modules,

examines applications of these systems in areas such as medicine and sports, and discusses the importance of an accurate design of microwave modules and antennas. Next-generation small antenna design techniques This authoritative text provides the most up-to-date methods on the theory and design of small antennas, including an extensive survey of small antenna literature published over the past several years. Written by experts at the forefront of antenna research, Small Antennas: Miniaturization Techniques & Applications begins with a detailed presentation of small antenna theory--narrowband and wideband--and progresses to small antenna design methods, such as materials and shaping approaches for multiband and wideband antennas. Generic miniaturization techniques are presented for narrowband, multiband, and wideband antennas. Two chapters devoted to metamaterials antennas and methods to achieve optimal small antennas, as well as a chapter on RFID technologies and related antennas, are included in this comprehensive volume. Coverage includes: Small antenna theory and optimal parameters Theory and limits of wideband electrically small antennas Extensive literature survey of small antenna designs Practical antenna miniaturization approaches Conformal wideband antennas based on spirals Negative refractive index (NRI) metamaterial and electromagnetic band gap (EBG) based antennas Small antennas based on magnetic photonic and degenerate band edge crystals Impedance matching for small antennas using passive and active circuits RFID antennas and technology

Practical, concise and complete reference for the basics of modern antenna design Antennas: from Theory to Practice discusses the basics of modern antenna design and theory. Developed specifically for engineers and designers who work with radio communications, radar and RF engineering, this book offers practical and hands-on treatment of antenna theory and techniques, and provides its readers the skills to analyse, design and measure various antennas. Key features: Provides thorough coverage on the basics of transmission lines, radio waves and propagation, and antenna analysis and design Discusses industrial standard design software tools, and antenna measurement equipment, facilities and techniques Covers electrically small antennas, mobile antennas, UWB antennas and new materials for antennas Also discusses reconfigurable antennas, RFID antennas, Wide-band and multi-band antennas, radar antennas, and MIMO antennas Design examples of various antennas are provided Written in a practical and concise manner by authors who are experts in antenna design, with experience from both academia and industry This book will be an invaluable resource for engineers and designers working in RF engineering, radar and radio communications, seeking a comprehensive and practical introduction to the basics of antenna design. The book can also be used as a textbook for advanced students entering a profession in this field.

Scattering matrix description of an antenna. Data reduction in spherical near-field measurements. Measurements. Error analysis of spherical near-field measurements. Plane-wave synthesis. Spherical wave functions, notation and properties. Rotation of spherical waves. Translation of spherical waves. Data processing in antenna measurements.

This book is a detailed account of electromagnetic band gap (EBG) theory, analysis and applications, ideal for researchers and engineers.

A rollicking anthology of free verse stories, rhymes and poems features the work of two

former British Laureates including the award-winning artist of the Roald Dahl stories. Up-to-date coverage of the analysis and applications of coplanarwaveguides to microwave circuits and antennas The unique feature of coplanar waveguides, as opposed to moreconventional waveguides, is their uniplanar construction, in whichall of the conductors are aligned on the same side of thesubstrate. This feature simplifies manufacturing and allows fasterand less expensive characterization using on-wafer techniques. Coplanar Waveguide Circuits, Components, and Systems isan engineer's complete resource, collecting all of the availabledata on the subject. Rainee Simons thoroughly discusses propagationparameters for conventional coplanar waveguides and includesvaluable details such as the derivation of the fundamentalequations, physical explanations, and numerical examples. Coverage also includes: Discontinuities and circuit elements Transitions to other transmission media Directional couplers, hybrids, and magic T Microelectromechanical systems based switches and phaseshifters Tunable devices using ferroelectric materials Photonic bandgap structures Printed circuit antennas

The Handbook of Antenna Technologies aims to present the rapid development of antenna technologies, particularly in the past two decades, and also showcasing the newly developed technologies and the latest applications. The handbook will provide readers with the comprehensive updated reference information covering theory, modeling and optimization methods, design and measurement, new electromagnetic materials, and applications of antennas. The handbook will widely cover not only all key antenna design issues but also fundamentals, issues related to antennas (transmission, propagation, feeding structure, materials, fabrication, measurement, system, and unique design challenges in specific applications). This handbook will benefit the readers as a full and quick technical reference with a high-level historic review of technology, detailed technical descriptions and the latest practical applications. Nowadays approximately 6 billion people use a mobile phone and they now take a central position within our daily lives. The 1990s saw a tremendous increase in the use of wireless systems and the democratization of this means of communication. To allow the communication of millions of phones, computers and, more recently, tablets to be connected, millions of access points and base station antennas have been extensively deployed. Small cells and the Internet of Things with the billions of connected objects will reinforce this trend. This growing use of wireless communications has been accompanied by a perception of risk to the public from exposure to radio frequency (RF) electromagnetic field (EMF). To address this concern, biomedical research has been conducted. It has also been important to develop and improve dosimetry methods and protocols that could be used to evaluate EMF exposure and check compliance with health limits. To achieve this, much effort has was made in the 1990s and 2000s. Experimental and numerical methods, including statistical methods, have been developed. This book provides an overview and description of the basic and advanced methods that have been developed for human RF exposure assessment. It covers experimental, numerical, deterministic and stochastic methods.

This book focuses on new techniques, analysis, applications and future trends of microstrip and printed antenna technologies, with particular emphasis to recent advances from the last decade Attention is given to fundamental concepts and techniques, their practical applications and the future scope of developments. Several

topics, essayed as individual chapters include reconfigurable antenna, ultra-wideband (UWB) antenna, reflectarrays, antennas for RFID systems and also those for body area networks. Also included are antennas using metamaterials and defected ground structures (DGSs). Essential aspects including advanced design, analysis and optimization techniques based on the recent developments have also been addressed. Key Features: Addresses emerging hot topics of research and applications in microstrip and printed antennas Considers the fundamental concepts, techniques, applications and future scope of such technologies Discusses modern applications such as wireless base station to mobile handset, satellite earth station to airborne communication systems, radio frequency identification (RFID) to body area networks, etc. Contributions from highly regarded experts and pioneers from the US, Europe and Asia This book provides a reference for R&D researchers, professors, practicing engineers, and scientists working in these fields. Graduate students studying/working on related subjects will find this book as a comprehensive literature for understanding the present and future trends in microstrip and printed antennas.

Increased to include over 25,000 organic and inorganic compounds, The Yaws Handbook of Vapor Pressure: Antoine Coefficients, 2nd Edition delivers the most comprehensive and practical database source for today's petrochemical. Understanding antoine coefficients for vapor pressure leads to numerous critical engineering applications such as pure components in storage vessels, pressure relief valve design, flammability limits at the refinery, as well as environmental emissions from exposed liquids, making data to efficiently calculate these daily challenges a fundamental need. Written by the world's leading authority on chemical and petrochemical data, The Yaws Handbook of Vapor Pressure simplifies the guesswork for the engineer and reinforces the credibility of the engineer's calculations with a single trust-worthy source. This data book is a must-have for the engineer's library bookshelf. Increase compound coverage from 8,200 to over 25,000 organic and inorganic compounds, including sulfur and hydrocarbons Solve process design questions quickly from a single reliable data source Locate answers easily for multiple petrochemical related questions such as bubble point, dew point temperatures, and vapor-liquid equilibrium

The merging of metasurface and holography brings about unprecedented opportunities for versatile manipulation of light in terms of both far-field wavefront and near-field profile. In this book, a brief evolving history from surface plasmon polariton holography to metamaterial holography and finally to metasurface holography is introduced at first. Basic physical mechanisms that govern the phase modulation rules behind metasurface holography design are discussed later. Next, extended functionalities such as arbitrary polarization holography, vectorial holography, full-color holography, and hybrid holography achieved in the metasurface platform are presented. Surface wave and metagrating holography that bridges the on-chip surface wave and free-space wave is also introduced. In the end, we envisage practical applications of high-fidelity 3D holographic display, high-secure encryption, and high capacity digital encoding and also indicate remaining challenges based on metasurface holography.