

Balanis Advanced Engineering Electromagnetics 2nd Solutions

This comprehensive resource provides readers with the tools necessary to perform analysis of various waveforms for use in radar systems. It provides information about how to produce synthetic aperture (SAR) images by giving a tomographic formulation and implementation for SAR imaging. Tracking filter fundamentals, and each parameter associated with the filter and how each affects tracking performance are also presented. Various radar cross section measurement techniques are covered, along with waveform selection analysis through the study of the ambiguity function for each particular waveform from simple linear frequency modulation (LFM) waveforms to more complicated coded waveforms. The text includes the Python tool suite, which allows the reader to analyze and predict radar performance for various scenarios and applications. Also provided are MATLAB® scripts corresponding to the Python tools. The software includes a user-friendly graphical user interface (GUI) that provides visualizations of the concepts being covered. Users have full access to both the Python and MATLAB source code to modify for their application. With examples using the tool suite are given at the end of each chapter, this text gives readers a clear understanding of how important target scattering is in areas of target detection, target tracking, pulse integration, and target discrimination.

The discipline of antenna theory has experienced vast technological changes. In response, Constantine Balanis has updated his classic text, *Antenna Theory*, offering the most recent look at all the necessary topics. New material includes smart antennas and fractal antennas, along with the latest applications in wireless communications. Multimedia material on an accompanying CD presents PowerPoint viewgraphs of lecture notes, interactive review questions, Java animations and applets, and MATLAB features. Like the previous editions, *Antenna Theory*, Third Edition meets the needs of electrical engineering and physics students at the senior undergraduate and beginning graduate levels, and those of practicing engineers as well. It is a benchmark text for mastering the latest theory in the subject, and for better understanding the technological applications. An Instructor's Manual presenting detailed solutions to all the problems in the book is available from the Wiley editorial department.

Advanced Engineering Electromagnetics John Wiley & Sons

Written by a leading expert in the field, this practical new resource presents the fundamentals of electromagnetics and antenna technology. This book covers the design, electromagnetic simulation, fabrication, and measurements for various types of antennas, including impedance matching techniques and transforming for ultrawideband dipoles, monopoles, loops, vector sensors for direction finding, HF curtain arrays, 3D printed nonplanar patch antenna arrays, waveguides for portable radar, reflector antennas, and other antennas. It explores the details of phased array antennas and includes derivations of important field equations, and a detailed formulation of the method of moments. This resource exhibits essential derivations of equations, providing readers with a strong foundation of the underpinnings of electromagnetics and antennas. It includes a complete chapter on the details of antenna and electromagnetic test and measurement. This book explores details of 3D printed non-planar circular patch array antenna technology and the design and analysis of a planar array-fed axisymmetric gregorian reflector. The lumped-element impedance matched antennas are examined and include a look at an analytic impedance matching solution with a parallel LC network. This book provides key insight into many aspects of antenna technology that have broad applications in radar and communications.

Fast Techniques for Integrated Circuit Design

Fundamentals of Engineering Electromagnetics: Pearson New International Edition

Electromagnetic Modeling and Simulation

Introduction to Smart Antennas

Surface Electromagnetics

This unique book presents simple, easy-to-use, but effective/short codes as well as virtual tools that can be used byelectrical, electronic, communication, and computer engineers in abroad range of electrical engineering problems Electromagnetic modeling is essential to the design and modelingof antenna, radar, satellite, medical imaging, and otherapplications. In this book, author Levect Sevgl explains techniquesfor solving real-time complex physical problems using MATLAB-basedshort scripts and comprehensive virtual tools. Unique in coverage and tutorial approach, ElectromagneticModeling and Simulation covers fundamental analytical andnumerical models that are widely used in teaching, research, andengineering designs—including mode and ray summationapproaches with the canonical 2D nonpenetrable parallel platewaveguide as well as FDTD, MoM, and SSPE scripts. The book alsoestablishes an intelligent balance among the essentials of EMMODSIM: The Problem (the physics), The Theory and Models(mathematical background and analytical solutions), and TheSimulations (code developing plus validation, verification, andcalibration). Classroom tested in graduate-level and short courses,Electromagnetic Modeling and Simulation: Clarifies concepts through numerous worked problems and quick-to-use MATLAB-based, user-friendly, effective engineering and research virtual design tools includes sample scenarios and video clips recorded duringcharacteristic simulations that visually impact learning—available on wiley.com Provides readers with their first steps in EM MODSIM as well astools for medium and high-level code developers and users Electromagnetic Modeling and Simulation thoroughly covers the physics, mathematical background, analytical solutions, andcode development of electromagnetic modeling, making it an idealresource for electrical engineers and researchers.

This book is a concise introduction to electromagnetics and electromagnetic fields that covers the aspects of most significance for engineering applications by means of a rigorous, analytical treatment. After an introduction to equations and basic theorems, topics of fundamental theoretical and applicative importance, including plane waves, transmission lines, waveguides and Green's functions, are discussed in a deliberately general way. Care has been taken to ensure that the text is readily accessible and self-consistent, with conservation of the intermediate steps in the analytical derivations. The book offers the reader a clear, succinct course in basic electromagnetic theory. It will also be a useful look-up tool for students and designers.

Learn how to use estimation techniques to solve real-world IC design problems and accelerate design processes with this practical guide.

As the growing demand for mobile communications is constantly increasing, the need for better coverage, improved capacity, and higher transmission quality rises. Thus, a more efficient use of the radio spectrum is required. Smart antenna systems are capable of efficiently utilizing the radio spectrum and is a promise for an effective solution to the present wireless systems' problems while achieving reliable and robust high-speed high-data-rate transmission. The purpose of this book is to provide the reader a broad view of the system aspects of smart antennas. In fact, smart antenna systems comprise several critical areas such as individual antenna array design, signal processing algorithms, space-time processing, wireless channel modeling and coding, and network performance. In this book we include an overview of smart antenna concepts, introduce some of the areas that impact smart antennas, and examine the influence of interaction and integration of these areas to Mobile Ad-Hoc Networks. In addition, the general principles and major benefits of using space-time processing are introduced, especially employing multiple-input multiple-output (MIMO) techniques.

Advanced Engineering Electromagnetics, 2nd Edition Wiley E-Text Reg Card

A Modern Approach to Classical Theorems of Advanced Calculus

A Student Friendly Introduction

Electromagnetic Fields and Waves in Fractional Dimensional Space

The Method of Moments in Electromagnetics

Key Features: *Physical aspects of the phenomena are clearly explained. Multiple model representations are employed as per necessity. Problems complementing the text are extensively given. About the Book: 'Basic Laws of Electromagnetism' is a book describing the Fundamental Laws of Electromagnetism with allied examples to help and enable the readers to attain a deeper understanding of the subject and visualize the wide range of applications of the ideas discussed. The book lays emphasis on the physical aspects of the phenomena, avoiding superfluous mathematical formulae. The textbook is quite handy for the students of senior secondary and undergraduate levels, and also for various engineering and medical entrance examinations. This is newly typeset print of a 'Classical Book' in Physics.*

Pozar's new edition of Microwave Engineering includes more material on active circuits, noise, nonlinear effects, and wireless systems. Chapters on noise and nonlinear distortion, and active devices have been added along with the coverage of noise and more material on intermodulation distortion and related nonlinear effects. On active devices, there's more updated material on bipolar junction and field effect transistors. New and updated material on wireless communications systems, including link budget, link margin, digital modulation methods, and bit error rates is also part of the new edition. Other new material includes a section on transients on transmission lines, the theory of power waves, a discussion of higher order modes and frequency effects for microstrip line, and a discussion of how to determine unloaded.

This book is an electromagnetics classic. Originally published in 1941, it has been used by many generations of students, teachers, and researchers ever since. Since it is classic electromagnetics, every chapter continues to be referenced to this day. This classic reissue contains the entire, original edition first published in 1941. Additionally, two new forewords by Dr. Paul E. Gray (former MIT President and colleague of Dr. Stratton) and another by Dr. Donald G. Dudley, Editor of the IEEE Press Series on E/M Waves on the significance of the book's contribution to the field of Electromagnetics.

Fundamentals of Materials Science and Engineering takes an integrated approach to the sequence of topics – one specific structure, characteristic, or property type is covered in turn for all three basic material types: metals, ceramics, and polymeric materials. This presentation permits the early introduction of non-metals and supports the engineer's role in choosing materials based upon their characteristics. Using clear, concise terminology that is familiar to students, Fundamentals presents material at an appropriate level for both student comprehension and instructors who may not have a materials background.

Springer Handbook of Ocean Engineering

Introduction to the Finite Element Method in Electromagnetics

Electromagnetic Engineering and Waves

Calculus on Manifolds

Ultrawideband Phased Array Antenna Technology for Sensing and Communications Systems

Wireless technology is a truly revolutionary paradigm shift, enabling multimedia communications between people and devices from any location. It also underpins exciting applications such as sensor networks, smart homes, telemedicine, and automated highways. This book provides a comprehensive introduction to the underlying theory, design techniques and analytical tools of wireless communications, focusing primarily on the core principles of wireless system design. The book begins with an overview of wireless systems and standards. The characteristics of the wireless channel are then described, including their fundamental capacity limits. Various modulation, coding, and signal processing schemes are then discussed in detail, including state-of-the-art adaptive modulation, multicarrier, spread spectrum, and multiple antenna techniques. The concluding chapters deal with multiuser communications, cellular system design, and ad-hoc network design. Design insights and tradeoffs are emphasized throughout the book. It contains many worked examples, over 200 figures, almost 300 homework exercises, over 700 references, and is an ideal textbook for students.

Time-Harmonic Electromagnetic Fields A Classic Reissue in the IEEE Press Series on Electromagnetic Wave Theory Donald G. Dudley, Series Editor "When I began a new research project, I clear my desk and put away all texts and reference books. Invariably, Harrington's book is the first book to find its way back to my desk. My copy is so worn that it is falling apart."--Dr. Kendall F. Casey, SRI "In the opinion of our faculty, there is no other book available that serves as well as Professor Harrington's as an introduction to advanced electromagnetic theory and to classic solution methods in electromagnetics."--Professor Chalmers M. Butler, Clemson University First published in 1961, Roger Harrington's Time-Harmonic Electromagnetic Fields is one of the most significant works in electromagnetic theory and applications. Over the past forty years, it proved to be a key resource for students, professors, researchers, and engineers who require a comprehensive, in-depth treatment of the subject. Now, IEEE is reissuing the classic in response to requests from our many members, who found it an invaluable textbook and an enduring reference for practicing engineers. About the IEEE Press Series on Electromagnetic Wave Theory The IEEE Press Series on Electromagnetic Wave Theory offers outstanding coverage of the field. It consists of new titles of contemporary interest as well as reissues and revisions of recognized classics by established authors and researchers. The series emphasizes works of long-term archival significance in electromagnetic waves and applications. Designed specifically for graduate students, researchers, and practicing engineers, the series provides affordable volumes that explore and explain electromagnetic waves beyond the undergraduate level.

Advanced Electromagnetic Computation with MATLAB® discusses commercial electromagnetic software, widely used in the industry. Algorithms of Finite Differences, Moment method, Finite Element method and Finite Difference Time Domain method are illustrated. Hand-computed simple examples and MATLAB-coded examples are used to explain the concepts behind the algorithms. Case studies of practical examples from transmission lines, waveguides, and electrostatic problems are given so students are able to develop the code and solve the problems. Two new chapters including advanced methods based on perturbation techniques and three dimensional finite element examples from radiation scattering are included.

Applied Electromagnetics and Electromagnetic Compatibility deals with Radio Frequency Interference (RFI), which is the reception of undesired radio signals originating from digital electronics and electronic equipment. With today's rapid development of radio communication, these undesired signals as well as signals due to natural phenomena such as lightning, sparking, and others are becoming increasingly important in the general area of Electro Magnetic Compatibility (EMC). EMC can be defined as the capability of some electronic equipment or system to be operated at desired levels of performance in a given electromagnetic environment without generating EM emissions unacceptable to other systems operating in the vicinity.

Microwave Engineering

Advanced Electromagnetic Computation

Handbook of Engineering Electromagnetics

From Fundamentals to Applications

Advanced Engineering Electromagnetics

Fundamental of Engineering Electromagnetics not only presents the fundamentals of electromagnetism in a concise and logical manner, but also includes a variety of interesting and important applications. While adapted from his popular and more extensive work, Field and Wave Electromagnetics, this text incorporates a number of innovative pedagogical features. Each chapter begins with an overview which serves to offer qualitative guidance to the subject matter and motivate the student. Review questions and worked examples throughout each chapter reinforce the student's understanding of the material. Remarks boxes following the review questions and margin notes throughout the book serve as additional pedagogical aids. Electromagnetic fields, both static and dynamic, form the foundational basis of all electrical and electronic engineering devices and systems. Aimed at undergraduate students, university teachers, design and consultant engineers and researchers this book presents an in-depth, simple and comprehensive reference source on electromagnetics engineering. In much of electrical and electronics engineering (including: analogue and digital telecommunications engineering; biomedical monitoring and diagnostic equipment; power systems engineering and sensor technology) getting back to the fundamental principles that govern the technologies, namely electromagnetic fields and waves, has become crucial for future customer friendly technology and systems. Electromagnetics Engineering Handbook has been written to enable undergraduate students studying electromagnetics engineering for the first time to gain an understanding of the essentials of the largely invisible, but powerful, electromagnetic fields governed by the four elegant Maxwell's equations. Moreover, the book helps to apply that knowledge through analytical and computational solutions of these frequency and material dependent electric and magnetic fields. As electrical and electronic engineering grows and subdivides into many specialities this book aims to inform the reader of the basic principles that govern all of these specialised systems and on how to apply that knowledge to understand and design devices and systems that may operate at vastly different frequencies and in various media (e. g. semiconductor materials, magnetic materials, biological tissues, outer space and sea water). It also deals with a range of different functions dependant on the area of application. For example at very low power frequencies electromagnetic fields perform vastly different functions from device to device, such as in power transformers; current transformers; infrared sensors; synchronous generators; superconducting devices; electric motors and electric powered transport systems. This handbook will be of great help to students, engineers, innovators and researchers working in a wide variety of disciplines

The Method of Moments in Electromagnetics, Third Edition details the numerical solution of electromagnetic integral equations via the Method of Moments (MoM). Previous editions focused on the solution of radiation and scattering problems involving conducting, dielectric, and composite objects. This new edition adds a significant amount of material on new, state-of-the-art compressive techniques. Included are new chapters on the Adaptive Cross Approximation (ACA) and Multi-Level Adaptive Cross Approximation (MLACA), advanced algorithms that permit a direct solution of the MoM linear system via LU decomposition in compressed form. Significant attention is paid to parallel solution of these methods on traditional central processing units (CPUs) as well as new, high performance graphics processing units (GPUs). Existing material on the Fast Multipole Method (FMM) and Multi-Level Fast Multipole Algorithm (MLFMA) is also updated, blending in elements of the ACA algorithm to further reduce their memory demands. The Method of Moments in Electromagnetics is intended for students, researchers, and industry experts working in the area of computational electromagnetics (CEM) and the MoM. Providing a bridge between theory and software implementation, the book incorporates significant background material, while presenting practical, nuts-and-bolts implementation details. It first derives a generalised set of surface integral equations used to treat electromagnetic radiation and scattering problems, for objects comprising conducting and dielectric regions. Subsequent chapters apply these integral equations for progressively more difficult problems such as thin wires, bodies of revolution, and two- and three-dimensional bodies. Radiation and scattering problems of many different types are considered, with numerical results compared against analytical theory as well as measurements.

This handbook is the definitive reference for the interdisciplinary field that is ocean engineering. It integrates the coverage of fundamental and applied material and encompasses a diverse spectrum of systems, concepts and operations in the maritime environment, as well as providing a comprehensive update on contemporary, leading-edge ocean technologies. Coverage includes an overview on the fundamentals of ocean science, ocean signals and instrumentation, coastal structures, developments in ocean energy technologies and ocean vehicles and automation. It aims at practitioners in a range of offshore industries and naval establishments as well as academic researchers and graduate students in ocean, coastal, offshore and marine engineering and naval architecture. The Springer Handbook of Ocean Engineering is organized in five parts: Part A: Fundamentals, Part B: Autonomous Ocean Vehicles, Subsystems and Control, Part C: Coastal Design, Part D: Offshore Technologies, Part E: Energy Conversion

Antenna Theory

A Primer on Electromagnetic Fields

With Applications in Antenna, Microwave, and Optical Engineering

No-Nonsense Electrodynamics

Analysis and Design of Transmittarray Antennas

Balanis' second edition of Advanced Engineering Electromagnetics – a global best-seller for over 20 years – covers the advanced knowledge engineers involved in electromagnetic need to know, particularly as the topic relates to the fast-moving, continually evolving, and rapidly expanding field of wireless communications. The immense interest in wireless communications and the expected increase in wireless communications systems projects (antenna, microwave and wireless communication) points to an increase in the number of engineers needed to specialize in this field. In addition, the Instructor Book Companion Site contains a rich collection of multimedia resources for use with this text. Resources include: Ready-made lecture notes in Power Point format for all the chapters. Forty-nine MATLAB® programs to compute, plot and animate some of the wave phenomena Nearly 600 end-of-chapter problems, that's an average of 40 problems per chapter (200 new problems; 50% more than in the first edition) A thoroughly updated Solutions Manual 2500 slides for Instructors are included.

The most up-to-date, comprehensive treatment of classical and modern antennas and their related technologies Modern Antenna Handbook represents the most current and complete thinking in the field of antennas. The handbook is edited by one of the most recognizable, prominent, and prolific authors, educators, and researchers on antennas and electromagnetics. Each chapter is authored by leading international experts and includes coverage of current and future antenna-related technology. The information is of a practical nature and is intended to be useful for researchers as well as practicing engineers. From the fundamental parameters of antennas to antennas for mobile wireless communications and medical applications, Modern Antenna Handbook provides engineers, professors, and students with the most up-to-date information about the recent developments and the future directions of this fast-paced field. In addition to antenna topics, the handbook also covers modern technologies such as metamaterials, microelectromechanical systems (MEMS), frequency selective surfaces (FSS), and radar cross sections (RCS) and their applications to antennas, while five chapters are devoted to advanced numerical/computational methods targeted primarily for the analysis and design of antennas.

Practical ultrawideband phased array technology used in airborne and ground-based systems applications. Ultrawideband phased array antennas are an enabling technology for many ground-based and airborne communications and radar systems. This book surveys electromagnetic theory and phased array antenna theory and provides examples of ultrawideband phased array antenna technology. It describes some of the research on ultrawideband phased arrays undertaken by the authors and their colleagues at MIT Lincoln Laboratory over the last ten years. The book focuses on experimental prototype ultrawideband phased array technology developed at Lincoln Laboratory for applications in the VHF and UHF bands from approximately 100 MHz to 1 GHz, and addresses dipole, monopole, loop, and other antenna array elements. It offers examples of antennas for both airborne and ground vehicle applications. Most of the examples are developed in the context of rapid prototyping for quick assessment of communications and radar systems feasibility, with measurements and numerical electromagnetic simulation results provided for many prototype examples. The book is intended primarily for practicing antenna engineers, radar engineers, and communications engineers, and for graduate students and researchers in electrical engineering. Readers need no prior knowledge of ultrawideband antennas, although some background in electromagnetic theory, antennas, radar, and communications would be helpful.

Written by the leading experts in the field, this text provides systematic coverage of the theory, physics, functional designs, and engineering applications of advanced engineered electromagnetic surfaces. All the essential topics are included, from the fundamental theorems of surface electromagnetics, to analytical models, general sheet transmission conditions (GSTC), metasurface synthesis, and quasi-periodic analysis. A plethora of examples throughout illustrate the practical applications of surface electromagnetics, including gap waveguides, modulated metasurface antennas, transmit arrays, microwave imaging, cloaking, and orbital angular momentum (OAM) beam generation, allowing readers to develop their own surface electromagnetics-based devices and systems. Enabling a fully comprehensive understanding of surface electromagnetics, this is an invaluable text for researchers, practicing engineers and students working in electromagnetics antennas, metasurfaces and optics.

Modern Electrodynamics

Electromagnetics Engineering Handbook

Electromagnetic Theory

Analysis and Design

Introduction to Microwave Imaging

"Engineering Electromagnetics and Waves" is designed for upper-division college and university engineering students, for those who wish to learn the subject through self-study, and for practicing engineers who need an up-to-date reference text. The student using this text is assumed to have completed typical lower-division courses in physics and mathematics as well as a first course on electrical engineering circuits. "This book provides engineering students with a solid grasp of electromagnetic fundamentals and electromagnetic waves by emphasizing physical understanding and practical applications. The topical organization of the text starts with an initial exposure to transmission lines and transients on high-speed distributed circuits, naturally bridging electrical circuits and electromagnetics.Teaching and Learning Experience>This program will provide a better teaching and learning experience-for you and your students. It provides: Modern Chapter Organization/Emphasis on Physical Understanding/Detailed Examples, Selected Application Examples, and Abundant Illustrations/Numerous End-of-chapter Problems, Emphasizing Selected Practical Applications/Historical Notes on the Great Scientific Pioneers/Emphasis on Clarity without Sacrificing Rigor and Completeness/Hundreds of Footnotes Providing Physical Insight, Leads for Further Reading, and Discussion of Subtle and Interesting Concepts and Applications"

In recent years, transmittarray antennas have attracted growing interest with many antenna researchers. Transmittarrays combines both optical and antenna array theory, leading to a low profile design with high gain, high radiation efficiency, and versatile radiation performance for many wireless communication systems. In this book, comprehensive analysis, new methodologies, and novel designs of transmittarray antennas are presented. Detailed analysis for the design of planar space-fed array antennas is presented. The basics of aperture field distribution and the analysis of the array elements are described. The radiation performances (directivity and gain) are discussed using array theory approach, and the impacts of element phase errors are demonstrated. The performance of transmittarray design using multilayer frequency selective surfaces (M-FSS) approach is carefully studied, and the transmission phase limit which are generally independent from the selection of a specific element shape is revealed. The maximum transmission phase range is determined based on the number of layers, substrate permittivity, and the separations between layers. In order to reduce the transmittarray design complexity and cost, three different methods have been investigated. As a result, one design is performed using quad-layer cross-slot elements with no dielectric material and another using triple-layer spiral dipole elements. Both designs were fabricated and tested at X-Band for deep space communications. Furthermore, the radiation pattern characteristics were studied under different feed polarization conditions and oblique angles of incident field from the feed. New design methodologies are proposed to improve the bandwidth of transmittarray antennas through the control of the transmission phase range of the elements. These design techniques are validated through the fabrication and testing of two quad-layer transmittarray antennas at Ku-band. A single-feed quad-beam transmittarray antenna with 50 degrees elevation separation between the beams is investigated, designed, fabricated, and tested at Ku-band. In summary, various challenges in the analysis and design of transmittarray antennas are addressed in this book. New methodologies to improve the bandwidth of transmittarray antennas have been demonstrated. Several prototypes have been fabricated and tested, demonstrating the desirable features and potential new applications of transmittarray antennas.

Reviews the fundamental concepts behind the theory and computation of electromagnetic fields The book is divided in two parts. The first part covers both fundamental theories (such as vector analysis, Maxwell's equations, boundary condition, and transmission line theory) and advanced topics (such as wave transformation, addition theorems, and fields in layered media) in order to benefit students at all levels. The second part of the book covers the major computational methods for numerical analysis of electromagnetic fields for engineering applications. These methods include the three fundamental approaches for numerical analysis of electromagnetic fields: the finite difference method (the finite difference time-domain method in particular), the finite element method, and the integral equation-based moment method. The second part also examines fast algorithms for solving integral equations and hybrid techniques that combine different numerical methods to seek more efficient solutions of complicated electromagnetic problems. Theory and Computation of Electromagnetic Fields, Second Edition: Provides the foundation necessary for graduate students to learn and understand more advanced topics Discusses electromagnetic analysis in rectangular, cylindrical and spherical coordinates Covers computational electromagnetics in both frequency and time domains Includes new and updated homework problems and examples Theory and Computation of Electromagnetic Fields, Second Edition is written for advanced undergraduate and graduate level electrical engineering students. This book can also be used as a reference for professional engineers interested in learning about analysis and computation skills.

With this self-contained, introductory text, readers will easily understand the fundamentals of microwave and radar image generation. Written with the complete novice in mind, and including an easy-to-follow introduction to electromagnetic scattering theory, it covers key topics such as forward models of scattering for interpreting S-parameter and time-dependent voltage data, S-parameters and their analytical sensitivity formulae, basic methods for real-time image reconstruction using frequency-sweep and pulsed-radar signals, and metrics for evaluating system performance. Numerous application examples and practical tutorial exercises provided throughout allow quick understanding of key concepts, and sample MATLAB codes implementing key reconstruction algorithms accompany the book online. This one-stop resource is ideal for graduate students taking introductory courses in microwave imaging, as well as researchers and industry professionals wanting to learn the fundamentals of the field.

Modern Antenna Handbook

Fundamentals of Materials Science and Engineering: An Integrated Approach, 5th Edition

Fundamentals of Radar Signal Processing

Electromagnetic Wave Propagation, Radiation, and Scattering

Time-Harmonic Electromagnetic Fields

Microwave testing has been paid scant attention in the literature as a method for nondestructive testing of materials, yet it offers some attractive features, especially for the testing of composite and other non-metallic materials. Microwave techniques have been used in a large number of applications that can be classified as nondestructive testing applications, ranging from large scale remote sensing to detection of tumors in the body. This volume describes a unified approach to microwave nondestructive testing by presenting the three essential components of testing: theory, practice, and modelling. While recognizing that each of these subjects is wide enough to justify a volume of its own, the presentation of the three topics together shows that these are interrelated and should be practiced together. While few will argue against a good theoretical background, modelling and simulation of the testing environment is seldom part of the NDT training in any method, but particularly so in microwave testing. The text is divided in four parts. The first part presents the field theory background necessary for understanding the microwave domain. The second part treats microwave measurements as well as devices and sources and the third part discusses practical tests applicable to a variety of materials and geometries. The fourth part discusses modelling of microwave testing. Each chapter contains a bibliography intended to expand on the material given and, in particular, to point to subjects which could not be covered either as not appropriate or for lack of space. For engineers, applied physicists, material scientists.

This book uses elementary versions of modern methods found in sophisticated mathematics to discuss portions of "advanced calculus" in which the subtlety of the concepts and methods makes rigor difficult to attain at an elementary level.

*Advances in DSP (digital signal processing) have radically altered the design and usage of radar systems -- making it essential for both working engineers as well as students to master DSP techniques. This text, which evolved from the author's own teaching, offers a rigorous, in-depth introduction to today's complex radar DSP technologies. Contents: Introduction to Radar Systems * Sampling and Quantization of Pulsed Radar Signals * Radar Waveforms * Pulse Compression Waveforms * Doppler Processing * Detection Fundamentals * Constant False Alarm Rate (CFAR) Detection * Introduction to Synthetic Aperture Imaging*

Learning Electrodynamics doesn't have to be boring What if there was a way to learn Electrodynamics without all the usual fluff? What if there were a book that allowed you to see the whole picture and not just tiny parts of it? Thoughts like this are the reason that No-Nonsense Electrodynamics now exists. What will you learn from this book? Get to know all fundamental electrodynamic concepts —Grasp why we can describe electromagnetism using the electric and magnetic field, the electromagnetic field tensor and the electromagnetic potential and how these concepts are connected.Learn to describe Electrodynamics mathematically — Understand the meaning and origin of the most important equations: Maxwell's equations & the Lorentz force law.Master the most important electrodynamic systems — read step-by-step calculations and understand the general algorithm we use to describe them.Get an understanding you can proud of — Learn why Special Relativity owes its origins to Electrodynamics and how we can understand it as a gauge theory. No-Nonsense Electrodynamics is the most student-friendly book on Arizona State University and is now Regents' Professor of Electrical Engineering. Dr. Balanis is also a life fellow of the IEEE.

Focuses solely on the goal to help you understand Nothing is introduced without a thorough motivation and it is always clear where each formula comes from.The book contains no fluff since unnecessary content quickly leads to confusion. Instead, it ruthlessly focuses on the fundamentals and makes sure you'll understand them in detail. The primary focus on the readers' needs is also visible in dozens of small features that you won't find in any other textbook In total, the book contains more than 100 illustrations that help you understand the most important concepts visually. In each chapter, you'll find fully annotated equations and calculations are done carefully step-by-step. This makes it much easier to understand what's going on in.Whenever a concept is used which was already introduced previously, there is a short sidenote that reminds you where it was first introduced and often recites the main points. In addition, there are summaries at the beginning of each chapter that make sure you won't get lost.

Theory and Computation of Electromagnetic Fields

Analysis and Design of Electrical and Electronic Devices and Systems

Applied Electromagnetics and Electromagnetic Compatibility

Basic Laws of Electromagnetism

Microwave NDT

The Latest Resource for the Study of Antenna Theory In a discipline that has experienced vast technological changes, this text offers the most recent look at all the necessary topics. Highlights include: * New coverage of microstrip antennas provides information essential to a wide variety of practical designs of rectangular and circular patches, including computer programs. * Applications of Fo transform (spectral) method to antenna radiation. * Updated material on moment methods, radar cross section, mutual impedances, aperture and horn antennas, compact range designs, and antenna measurements. A New Emphasis on Design! Balanis features a tremendous increase in design procedures and equations. This presents a solid solution to the challenge of meeting real-life situations faced by engineers. Computer programs contained in the book-and accompanying software have been developed to help engineers analyze, design, and visualize the radiation characteristics of antennas.

An advanced treatment of the main concepts of radar. Systematic and/or ganized, it nicely balances readability with mathematical rigor.Many techniques and examples have been chosen from the radarindustry (Rayleigh fluctuating targets are used as they yieldsimple expressions for the probability of detection), and othersfor their pedagogical value (Costas signals lead the coded radarsignals because they can be integrated).Ordered state is covered in more depth than otherCFAR techniques because its performance can be obtainedanalytically without resorting to simulation methods. Contains manyexercises. An Instructor's Manual presenting detailed solutions to all theproblems in the book is available from the Wiley editorialdepartment.

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 Arizona State students and researchers in electrical engineering.

An engaging writing style and a strong focus on the physics make this graduate-level textbook a must-have for electromagnetism students. Radar Principles Electromagnetics and Antenna Technology

Introduction to Radar Using Python and MATLAB

Wireless Communications

Updated with color and gray scale illustrations, a companion website housing supplementary material, and new sections covering recent developments in antenna analysis and design This book introduces the fundamental principles of antenna theory and explains how to apply them to the analysis, design, and measurements of antennas. Due to the variety of methods of analysis and design, and the different antenna structures available, the applications covered in this book are made to some of the most basic and practical antenna configurations. Among these antenna configurations are linear dipoles; loops; arrays; broadband antennas; aperture antennas; horns; microstrip antennas; and reflector antennas. The text contains sufficient mathematical detail to enable undergraduate and beginning graduate students in electrical engineering and physics to follow the flow of analysis and design. Readers should have a basic knowledge of undergraduate electromagnetic theory, including Maxwell's equations and the wave equation, introductory physics, and differential and integral calculus. Presents new sections on flexible and conformal bowtie, Vivaldi antenna, antenna miniaturization, antennas for mobile communications, dielectric resonator antennas, and scale modeling Provides color and gray scale figures and illustrations to better depict antenna radiation characteristics Includes access to a companion website housing MATLAB programs, Java-based applets and animations, Power Point notes, Java-based interactive questionnaires and a solutions manual for instructors Introduces over 100 additional end-of-chapter problems Antenna Theory: Analysis and Design, Fourth Edition is designed to meet the needs of senior undergraduate and beginning graduate level students in electrical engineering and physics, as well as practicing engineers and antenna designers. Constantine A. Balanis received his BSEE degree from the Virginia Tech in 1964, his MEE degree from the University of Virginia in 1966, his PhD in Electrical Engineering from The Ohio State University in 1969, and an Honorary Doctorate from the Aristotle University of Thessaloniki in 2004. From 1964 to 1970, he was with the NASA Langley Research Center in Hampton, VA, and from 1970 to 1983, he was with the Department of Electrical Engineering of West Virginia University. In 1983 he joined Arizona State University and is now Regents' Professor of Electrical Engineering. Dr. Balanis is also a life fellow of the IEEE.

This series lecture is an introduction to the finite element method with applications in electromagnetics. The finite element method is a numerical method that is used to solve boundary-value problems characterized by a partial differential equation and a set of boundary conditions. The geometrical domain of a boundary-value problem is discretized using sub-domain elements, called the finite elements, and the differential equation is applied to a single element after it is brought to a "weak" integro-differential form. A set of shape functions is used to represent the primary unknown variable in the element domain. A set of linear equations is obtained for each element in the discretized domain. A global matrix system is formed after the assembly of all elements. This lecture is divided into two chapters. Chapter 1 describes one-dimensional boundary-value problems with applications to electrostatic problems described by the Poisson's equation. The accuracy of the finite element method is evaluated for linear and

higher order elements by computing the numerical error based on two different definitions. Chapter 2 describes two-dimensional boundary-value problems in the areas of electrostatics and electrodynamics (time-harmonic problems). For the second category, an absorbing boundary condition was imposed at the exterior boundary to simulate undisturbed wave propagation toward infinity. Computations of the numerical error were performed in order to evaluate the accuracy and effectiveness of the method in solving electromagnetic problems. Both chapters are accompanied by a number of Matlab codes which can be used by the reader to solve one- and two-dimensional boundary-value problems. These codes can be downloaded from the publisher's URL: www.morganclaypool.com/page/polycarpou This lecture is written primarily for the nonexpert engineer or the undergraduate or graduate student who wants to learn, for the first time, the finite element method with applications to electromagnetics. It is also targeted for research engineers who have knowledge of other numerical techniques and want to familiarize themselves with the finite element method. The lecture begins with the basics of the method, including formulating a boundary-value problem using a weighted-residual method and the Galerkin approach, and continues with imposing all three types of boundary conditions including absorbing boundary conditions. Another important topic of emphasis is the development of shape functions including those of higher order. In simple words, this series lecture provides the reader with all information necessary for someone to apply successfully the finite element method to one- and two-dimensional boundary-value problems in electromagnetics. It is suitable for newcomers in the field of finite elements in electromagnetics. This book presents the concept of fractional dimensional space applied to the use of electromagnetic fields and waves. It provides demonstrates the advantages in studying the behavior of electromagnetic fields and waves in fractal media. The book presents novel fractional space generalization of the differential electromagnetic equations is provided as well as a new form of vector differential operators is formulated in fractional space. Using these modified vector differential operators, the classical Maxwell's electromagnetic equations are worked out. The Laplace's, Poisson's and Helmholtz's equations in fractional space are derived by using modified vector differential operators. Engineers do not have the time to wade through rigorously theoretical books when trying to solve a problem. Beginners lack the expertise required to understand highly specialized treatments of individual topics. This is especially problematic for a field as broad as electromagnetics, which propagates into many diverse engineering fields. The time h