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FOUNDATIONS FOR MICROWAVE ENGINEERING, 2ND ED John Wiley & Sons About The Book: The book covers the major topics of microwave engineering. Its presentation defines the accepted standard for both advanced undergraduate and graduate level courses on microwave engineering. It is an essential reference book for the practicing microwave engineer Foundations for Microwave Engineering An Instructor's Manual presenting detailed solutions to all the problems in the book is available upon request from the Wiley Marketing Department. Designing Microwave Sensors for Glucose Concentration Detection in Aqueous and Biological Solutions Towards Non-invasive Glucose Sensing Springer Nature This book presents a comprehensive study covering the design and application of microwave sensors for glucose concentration detection, with a special focus on glucose concentration tracking in watery and biological solutions. This book is based on the idea that changes in the glucose concentration provoke variations in the dielectric permittivity of the medium. Sensors whose electrical response is sensitive to the dielectric permittivity of the surrounding media should be able to perform as glucose concentration trackers. At first, this book offers an in-depth study of the dielectric permittivity of water-glucose solutions at concentrations relevant for diabetes purposes; in turn, it presents guidelines for designing suitable microwave resonators, which are then tested in both water-glucose solutions and multi-component human blood plasma solutions for their detection ability and sensitivities. Finally, a portable version is developed and tested on a large number of individuals in a real clinical scenario. All in all, the book reports on a comprehensive study on glucose monitoring devices based on microwave sensors. It covers in depth the theoretical background, provides extensive design guidelines to maximize sensitivity, and validates a portable device for applications in clinical settings. Soft Computing Methods for Practical Environment Solutions: Techniques and Studies Techniques and Studies IGI Global "This publication presents a series of practical applications of different Soft Computing techniques to real-world problems, showing the enormous potential of these techniques in solving problems"--Provided by publisher. Customized Complete Foundations of Microwave Engineering Field Theory of Guided Waves John Wiley & Sons "Co-published with Oxford University Press Long considered the most comprehensive account of electromagnetic theory and analytical methods for solving waveguide and cavity problems, this new Second Edition has been completely revised and thoroughly updated -- approximately 40% new material!Packed with examples and applications FIELD THEORY OF GUIDED WAVES provides solutions to a large number of practical structures of current interest. The book includes an exceptionally complete discussion of scalar and Dyadic Green functions. Both a valuable review and source of basic information on applied mathematical topics and a hands-on source for solution methods and techniques, this book belongs on the desk of all engineers working in microwave and antenna systems!" Sponsored by: IEEE Antennas and Propagation Society Microwave Engineering John Wiley & Sons 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. RF and Microwave Circuit Design Theory and Applications John Wiley & Sons This textbook covers a typical modern syllabus in radio frequency or microwave design at final year undergraduate or first year postgraduate level. The content has been chosen to include all of the basic topics necessary to give a rigorous introduction to high-frequency technology. Both the content and presentation reflect the considerable experience which both authors have in teaching and research at university level. The material is presented from first principles, and relies only on students having a reasonable grasp of basic electronic principles. One of the key features of the book is the inclusion of an extensive set of worked examples to guide the student reader who has no prior knowledge of the subject. Handbook of Engineering Electromagnetics CRC Press 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 The RF and Microwave Handbook CRC Press The recent shift in focus from defense and government work to commercial wireless efforts has caused the

job of the typical microwave engineer to change dramatically. The modern microwave and RF engineer is expected to know customer expectations, market trends, manufacturing technologies, and factory models to a degree that is unprecedented in the *The Electrical Engineering Handbook*, Second Edition CRC Press In 1993, the first edition of *The Electrical Engineering Handbook* set a new standard for breadth and depth of coverage in an engineering reference work. Now, this classic has been substantially revised and updated to include the latest information on all the important topics in electrical engineering today. Every electrical engineer should have an opportunity to expand his expertise with this definitive guide. In a single volume, this handbook provides a complete reference to answer the questions encountered by practicing engineers in industry, government, or academia. This well-organized book is divided into 12 major sections that encompass the entire field of electrical engineering, including circuits, signal processing, electronics, electromagnetics, electrical effects and devices, and energy, and the emerging trends in the fields of communications, digital devices, computer engineering, systems, and biomedical engineering. A compendium of physical, chemical, material, and mathematical data completes this comprehensive resource. Every major topic is thoroughly covered and every important concept is defined, described, and illustrated. Conceptually challenging but carefully explained articles are equally valuable to the practicing engineer, researchers, and students. A distinguished advisory board and contributors including many of the leading authors, professors, and researchers in the field today assist noted author and professor Richard Dorf in offering complete coverage of this rapidly expanding field. No other single volume available today offers this combination of broad coverage and depth of exploration of the topics. *The Electrical Engineering Handbook* will be an invaluable resource for electrical engineers for years to come.

Digital Microwave Communication Engineering Point-to-Point Microwave Systems John Wiley & Sons The first book to cover all engineering aspects of microwave communication path design for the digital age Fixed point-to-point microwave systems provide moderate-capacity digital transmission between well-defined locations. Most popular in situations where fiber optics or satellite communication is impractical, it is commonly used for cellular or PCS site interconnectivity where digital connectivity is needed but not economically available from other sources, and in private networks where reliability is most important. Until now, no book has adequately treated all engineering aspects of microwave communications in the digital age. This important new work provides readers with the depth of knowledge necessary for all the system engineering details associated with fixed point-to-point microwave radio path design: the why, what, and how of microwave transmission; design objectives; engineering methodologies; and design philosophy (in the bid, design, and acceptance phase of the project). Written in an easily accessible format, *Digital Microwave Communication* features an appendix of specialized engineering details and formulas, and offers up chapter coverage of: A Brief History of Microwave Radio Microwave Radio Overview System Components Hypothetical Reference Circuits Multipath Fading Rain Fading Reflections and Obstructions Network Reliability Calculations Regulation of Microwave Radio Networks Radio Network Performance Objectives Designing and Operating Microwave Systems Antennas Radio Diversity Ducting and Obstruction Fading Digital Receiver Interference Path Performance Calculations *Digital Microwave Communication: Engineering Point-to-Point Microwave Systems* will be of great interest to engineers and managers who specify, design, or evaluate fixed point-to-point microwave systems associated with communications systems and equipment manufacturers, independent and university research organizations, government agencies, telecommunications services, and other users.

Electronics, Power Electronics, Optoelectronics, Microwaves, Electromagnetics, and Radar CRC Press In two editions spanning more than a decade, *The Electrical Engineering Handbook* stands as the definitive reference to the multidisciplinary field of electrical engineering. Our knowledge continues to grow, and so does the Handbook. For the third edition, it has expanded into a set of six books carefully focused on a specialized area or field of study. *Electronics, Power Electronics, Optoelectronics, Microwaves, Electromagnetics, and Radar* represents a concise yet definitive collection of key concepts, models, and equations in these areas, thoughtfully gathered for convenient access. *Electronics, Power Electronics, Optoelectronics, Microwaves, Electromagnetics, and Radar* delves into the fields of electronics, integrated circuits, power electronics, optoelectronics, electromagnetics, light waves, and radar, supplying all of the basic information required for a deep understanding of each area. It also devotes a section to electrical effects and devices and explores the emerging fields of microlithography and power electronics. Articles include defining terms, references, and sources of further information. Encompassing the work of the world's foremost experts in their respective specialties, *Electronics, Power Electronics, Optoelectronics, Microwaves, Electromagnetics, and Radar* features the latest developments, the broadest scope of coverage, and new material in emerging areas.

Applied Frequency-Domain Electromagnetics John Wiley & Sons TEM waves -- Waveguides -- Potentials, concepts, and theorems -- Canonical problems -- Method of moments -- Finite element method -- Uniform theory of diffraction -- Physical theory of diffraction -- Scalar and dyadic Green's functions -- Green's functions construction I -- Green's functions construction II EDN, *Electrical Design News* Digital Tools and Solutions for Inquiry-Based STEM Learning IGI Global In the digital age, the integration of technology has become a ubiquitous aspect of modern society. These advancements have significantly enhanced the field of education, allowing students to receive a better learning experience. *Digital Tools and Solutions for Inquiry-Based STEM Learning* is a comprehensive source of scholarly material on the transformation of science education classrooms through the application of technology. Including numerous perspectives on topics such as instructional design, social media, and scientific argumentation, this book is ideally designed for educators, graduate students, professionals, academics, and practitioners interested in the latest developments in the field of STEM education.

Advances in Emerging Trends and Technologies Volume 2 Springer Nature This book constitutes the proceedings of the 1st International Conference on Advances in Emerging Trends and Technologies (ICAETT 2019), held in Quito, Ecuador, on 29-31 May 2019, jointly organized by Universidad Tecnológica Israel, Universidad Técnica del Norte, and Instituto Tecnológico

Superior Rumiñahui, and supported by SNOTRA. ICAETT 2019 brought together top researchers and practitioners working in different domains of computer science to share their expertise and to discuss future developments and potential collaborations. Presenting high-quality, peer-reviewed papers, the book discusses the following topics: Technology Trends Electronics Intelligent Systems Machine Vision Communication Security e-Learning e-Business e-Government and e-Participation Fundamentals of RF and Microwave Transistor Amplifiers John Wiley & Sons A Comprehensive and Up-to-Date Treatment of RF and Microwave Transistor Amplifiers This book provides state-of-the-art coverage of RF and microwave transistor amplifiers, including low-noise, narrowband, broadband, linear, high-power, high-efficiency, and high-voltage. Topics covered include modeling, analysis, design, packaging, and thermal and fabrication considerations. Through a unique integration of theory and practice, readers will learn to solve amplifier-related design problems ranging from matching networks to biasing and stability. More than 240 problems are included to help readers test their basic amplifier and circuit design skills-and more than half of the problems feature fully worked-out solutions. With an emphasis on theory, design, and everyday applications, this book is geared toward students, teachers, scientists, and practicing engineers who are interested in broadening their knowledge of RF and microwave transistor amplifier circuit design. Introduction to Microwave Circuits Radio Frequency and Design Applications John Wiley & Sons "Do you want to design a wireless transmitter or receiver for hand-held telephones? Have you wondered why the printed circuit wires on high-frequency circuits don't always run in a straight line? This valuable text will answer all of your questions regarding component parasitics and circuit characterization for rf/microwave amplifier, oscillator, and filter circuit design and analysis. You will understand why capacitors act as inductors and vice versa and why amplifiers work like oscillators, while oscillators for local area networks work more like local area heaters. Application of the information in Introduction to Microwave Circuits will reduce design-cycle time and costs, markedly increasing the probability of first-time success in printed circuit or monolithic microwave integrated circuit (MMIC) design. Several approaches are taken into consideration, such as the effects of currents on the ground plane, bypass and coupling capacitors, and nonlinear effects in linear circuits. Featured topics include: * Incorporation of component parasitics in the design cycle * Closed form solution to oscillator design * Odd mode stability analysis * PIN diode analysis for high-power switching applications An integrated design example of a 1.25 GHz amplifier, oscillator, and filter printed circuit is also included, which could be useful in printed circuit board designs from tens of megahertz to tens of gigahertz. Introduction to Microwave Circuits provides the tools necessary to analyze or synthesize microwave circuits. This text is an essential reference for undergraduate students, microwave engineers, and administrators. Also, it will assist experienced designers in other fields to meet the current rapid expansion of communication system applications and work effectively in microwave circuit design. About the Author Robert J. Weber began his prolific career in the Solid State Research Laboratory at the Collins Radio Company, later a part of Rockwell International. For 25 years, he worked on advanced development and applied research in the one- to ten-gigahertz frequency range and received several distinguished awards for his valuable contributions to the field. Dr. Weber is involved in ongoing experimental research in integrating microwave circuits with other devices such as MEMS, chemical sensors, and electro-optics. Also, he teaches microwave circuit design and fiber-optics communications at the Department of Electrical and Computer Engineering, Iowa State University. Dr. Weber is an IEEE Fellow." Sponsored by: IEEE Microwave Theory and Techniques Society. EDN. Radar Cross Section SciTech Publishing The leading text and reference on radar cross section (RCS) theory and applications, this work presents a comparison of two radar signal strengths. One is the strength of the radar beam sweeping over a target, the other is the strength of the reflected echo sensed by the receiver. This book shows how the RCS "gauge" can be predicted for theoretical objects. An Introduction to Microwave Measurements CRC Press Go Beyond Basic Distributed Circuit Analysis An Introduction to Microwave Measurements has been written in a way that is different from many textbooks. As an instructor teaching a master's-level course on microwave measurements, the author recognized that few of today's graduate electrical engineering students are knowledgeable about microwave measurements. Components and Devices Elsevier Handbook of Microwave Technology, Volume I: Components and Devices is a compact reference tool which provides both the fundamentals and applications of microwave technology. This volume covers components and devices used in microwave circuits. Chapters in the book discuss topics on microwave transmission lines, microwave resonators, and microstrip line components. Microwave impedance matching techniques, applications of microwave thermionic density modulated devices, and microwave transistor oscillators and amplifiers are tackled as well. Technicians, scientists, engineers, and science and engineering students who are involved in microwave technology will find the text very useful. Microwave Circuit Design Using Linear and Nonlinear Techniques John Wiley & Sons The ultimate handbook on microwave circuit design with CAD. Full of tips and insights from seasoned industry veterans, Microwave Circuit Design offers practical, proven advice on improving the design quality of microwave passive and active circuits-while cutting costs and time. Covering all levels of microwave circuit design from the elementary to the very advanced, the book systematically presents computer-aided methods for linear and nonlinear designs used in the design and manufacture of microwave amplifiers, oscillators, and mixers. Using the newest CAD tools, the book shows how to design transistor and diode circuits, and also details CAD's usefulness in microwave integrated circuit (MIC) and monolithic microwave integrated circuit (MMIC) technology. Applications of nonlinear SPICE programs, now available for microwave CAD, are described. State-of-the-art coverage includes microwave transistors (HEMTs, MODFETs, MESFETs, HBTs, and more), high-power amplifier design, oscillator design including feedback topologies, phase noise and examples, and more. The techniques presented are illustrated with several MMIC designs, including a wideband amplifier, a low-noise amplifier, and an MMIC mixer. This unique, one-stop handbook also features a major case study of an actual anticollision radar transceiver, which is compared in detail against CAD predictions;

examples of actual circuit designs with photographs of completed circuits; and tables of design formulae. **Electromagnetic Scattering and Material Characterization** Artech House Based on the author's more than 30 years of experience, this first-of-its-kind volume presents a comprehensive and systematic analysis of electromagnetic fields and their scattering by material objects. The book considers all three categories of scattering environments commonly used for material measurements: unbounded regions, waveguides, and cavity resonators. The book covers such essential topics as electromagnetic field propagation, radiation, and scattering, containing mathematically rigorous approaches for the computation of electromagnetic fields and the explanation of their behavior. Moreover, the book explores new measurement techniques for material characterization most of which have never been published before. This detailed reference is packed with over 400 equations.

X-15 Extending the Frontiers of Flight 1. A new science / 2. A hypersonic research airplane / 3. Conflict and innovation / 4. The million-horsepower engine / 5. High range and dry lakes / 6. Preparations / 7. The flight program / 8. The research program.

High Frequency and Microwave Engineering Newnes CD-ROM contains: PUFF 2.1 for construction and evaluation of circuits. **Microwave Devices and Circuits** Pearson Education India Telephone Engineer & Management The **Electronics Handbook** CRC Press During the ten years since the appearance of the groundbreaking, bestselling first edition of **The Electronics Handbook**, the field has grown and changed tremendously. With a focus on fundamental theory and practical applications, the first edition guided novice and veteran engineers along the cutting edge in the design, production, installation, operation, and maintenance of electronic devices and systems. Completely updated and expanded to reflect recent advances, this second edition continues the tradition. **The Electronics Handbook, Second Edition** provides a comprehensive reference to the key concepts, models, and equations necessary to analyze, design, and predict the behavior of complex electrical devices, circuits, instruments, and systems. With 23 sections that encompass the entire electronics field, from classical devices and circuits to emerging technologies and applications, **The Electronics Handbook, Second Edition** not only covers the engineering aspects, but also includes sections on reliability, safety, and engineering management. The book features an individual table of contents at the beginning of each chapter, which enables engineers from industry, government, and academia to navigate easily to the vital information they need. This is truly the most comprehensive, easy-to-use reference on electronics available.

CMOS RF Modeling, Characterization and Applications World Scientific CMOS technology has now reached a state of evolution, in terms of both frequency and noise, where it is becoming a serious contender for radio frequency (RF) applications in the GHz range. Cutoff frequencies of about 50 GHz have been reported for 0.18 μm CMOS technology, and are expected to reach about 100 GHz when the feature size shrinks to 100 nm within a few years. This translates into CMOS circuit operating frequencies well into the GHz range, which covers the frequency range of many of today's popular wireless products, such as cell phones, GPS (Global Positioning System) and Bluetooth. Of course, the great interest in RF CMOS comes from the obvious advantages of CMOS technology in terms of production cost, high-level integration, and the ability to combine digital, analog and RF circuits on the same chip. This book discusses many of the challenges facing the CMOS RF circuit designer in terms of device modeling and characterization, which are crucial issues in circuit simulation and design.

Metamaterials and Metasurfaces BoD - Books on Demand Metamaterials have provided applications in spectral ranges covering radio frequencies and ultraviolet. However, most applications have been extrapolated to the visible or near-infrared after being developed at the GHz level. This is due to technological reasons since fabrication of microwave antennas is not as demanding as THz resonators or plasmonic nanostructures. Accordingly, this book has been divided into three parts. In the first part, fundamentals of metamaterials and metadevices are discussed, while describing recent advances in the field. In the second part, the discussion is extended to the different spectral ranges focusing on the strategies for enabling the reconfigurability of metadevices. Given the increasing interest in THz applications, these can be found in the third part.

Green's Function, Finite Elements and Microwave Planar Circuits John Wiley & Son Limited The application of Green's function to planar microwave circuits is now very well accepted as a fundamental tool in electromagnetic analysis. Combining various modern mathematical techniques this book presents comprehensive and detailed methods for numerically describing practical microwave circuits (with one or more ports). Features include: Applications of Green's function in: planar resonators, gyromagnetic circuits and junction circulators, together with applied examples Detailed explanation of the use of Finite Element Method (FEM) techniques for calculating the solution of planar isotropic and gyromagnetic circuits Specifically written for industrial engineers specialising in the analysis and development of planar circuits and postgraduate researchers A perfect companion text for developing software for the solution of microwave circuits.

Radar RF Circuit Design, Second Edition Artech House This new edition of a previous bestseller gives you practical techniques for optimizing RF and microwave circuits for applications in radar systems design, with an emphasis on current and emerging technologies. Completely updated with new material, the book shows you how to design RF components for radar systems and how to choose appropriate materials and packaging methods. It takes you through classic techniques, to the state of the art, and finally to emerging technologies. You will learn: How to design high-frequency circuits for use in radar applications How to integrate components while avoiding higher-level assembly issues and troubleshooting problems on the measurement bench How to properly simulate, build, assemble, and test high-frequency circuits How to debug issues with hardware on the bench How to connect microwave theory to practical circuit design Theory and practical information are provided while addressing topics ranging from heat removal to digital circuit integration. The book serves as a teaching aid for classic techniques that are still relevant today. It also demonstrates how these techniques are serving as the foundation for technologies to come. You will be equipped to consider future needs and emerging enabling technologies and confidently think (and design) outside the box to ensure future needs are met. The book also shows you how to incorporate modern design techniques often overlooked or underused, and will

help you to better understand the capabilities and limitations of today's technology and the emerging technologies that are on the horizon to mitigate those limitations. This is a must-have resource for system-level radar designers who want to up their game in RF/microwave component design. It is also a great tool for RF/microwave engineers tasked or interested in designing components for radar systems. Students and new designers of radar components will also benefit and be well prepared to start designing immediately.

Catalog of Copyright Entries. Third Series 1966: January-June Copyright Office, Library of Congress Review of Progress in Quantitative Nondestructive Evaluation Springer Science & Business Media These Proceedings, consisting of Parts A and B, contain the edited versions of most of the papers presented at the annual Review of Progress in Quantitative Nondestructive Evaluation held at Bowdoin College, Brunswick, Maine on July 28 to August 2, 1996. The Review was organized by the Center for NDE at Iowa State University, in cooperation with the American Society of Nondestructive Testing, the Ames Laboratory of the USDOE, the Federal Aviation Administration, the National Institute of Standards and Technology, and the National Science Foundation Industry/University Cooperative Research Centers program. This year's Review of Progress in QNDE was attended by approximately 400 participants from the U.S. and many foreign countries who presented over 350 papers. As usual, the meeting was divided into 36 sessions, with as many as four sessions running concurrently. The Review covered all phases of NDE research and development from fundamental investigations to engineering applications or inspection systems, and it included many important methods of inspection techniques from acoustics to x-rays. In the last eight to ten years, the Review has stabilized at about its current size, which most participants seem to agree is large enough to permit a full-scale overview of the latest developments, but still small enough to retain the collegial atmosphere which has marked the Review since its inception.

Numerical Methods in Computational Electrodynamics Linear Systems in Practical Applications Springer Science & Business Media This interdisciplinary book deals with the solution of large linear systems as they typically arise in computational electrodynamics. It presents a collection of topics which are important for the solution of real life electromagnetic problems with numerical methods - covering all aspects ranging from numerical mathematics up to measurement techniques. Special highlights include a first detailed treatment of the Finite Integration Technique (FIT) in a book - in theory and applications, a documentation of most recent algorithms in use in the field of Krylov subspace methods in a unified style, a discussion on the interplay between simulation and measurement with many practical examples.

Radio-Frequency Heating in Food Processing Principles and Applications CRC Press Radio-Frequency Heating in Food Processing: Principles and Applications covers the fundamentals of radio-frequency (RF) heating and the use of RF-heating technologies in modern food processing, preservation, and related industries. Focusing on industrial and lab-scale applications where RF heating has been employed successfully or reported to have potential benefits over conventional heating options, this state-of-the-art reference: Explains the similarities, differences, advantages, and limitations of RF and microwave heating as applied to agricultural products Describes fiber-optics temperature sensors and their utility in monitoring temperature during RF and microwave heating Discusses the dielectric and thermo-physical properties of agricultural products amenable to RF and microwave heating, presenting measurement techniques, mathematical concepts, and computer simulation models Provides practical perspectives on industrial RF units used in manufacturing food products, addressing free-running oscillators and 50- Ω designs for RF heaters and applicators Uses finite-element formulations to determine design parameters including resonant modes, circuit impedance, and electric field distribution in RF applicators Examines RF-heating effects on microorganisms, enzymes, and food quality attributes for products such as poultry, beef, pork, eggs, fish, milk, fruits, vegetables, and seafood Explores RF-heating applications beyond food processing, such as agricultural product deinfestation, waste treatment, counterfeit prevention, package tracking, and transportation of food from farm to table

Radio-Frequency Heating in Food Processing: Principles and Applications supplies an in-depth overview of the fundamental science and engineering principles governing RF applications, as well as a solid understanding of industrial RF unit design options, challenges, and opportunities for development.

Telecommunication Electronics Artech House This practical, hands-on resource describes functional units and circuits of telecommunication systems. The functions characterizing these systems, including RF amplifiers (both low noise and power amplifiers), signal sources, mixers and phase lock loops, are explored from an operational level viewpoint. And as all functions are migrating to digital implementations, this book describes functional units and circuits of telecommunication systems (with radio, wire, or optical links), from functional level viewpoint to the circuit details and examples. The structure of a radio transceiver is described and a view of all functional units, including migration to SDR (Software Defined Radio) is provided. Chapters include a functional identification of the units described and analysis of possible circuit solutions and analysis of error sources. The sequence reflects the actual design procedure: functional identification, search and analysis of solutions, and critical review to provide an understanding of the various solutions and tradeoffs, with guidelines for design and/or selection of proper functional units.

Foundations of Applied Electrodynamics John Wiley & Sons Foundations of Applied Electrodynamics takes a fresh look at the essential concepts and methods of electrodynamics as a whole, uniting the most relevant contemporary topics under a common mathematical framework. It contains clear explanations of high-level concepts as well as the mutual relationships between the essential ideas of electromagnetic theory. Starting with the fundamentals of electrodynamics, it methodically covers a wide spectrum of research and applications that stem from electromagnetic phenomena, before concluding with more advanced topics such as quantum mechanics. Includes new advances and methodologies in applied electrodynamics, and provides the whole picture of the theory of electrodynamics in most active areas of engineering applications Systematically deals with eigenvalue problems, integral equation formulations and transient phenomena in various areas of applied electrodynamics Introduces the complete theory of spherical vector wave functions, and presents the upper bounds of the product of gain and bandwidth for an

arbitrary antenna Presents the field approach to multiple antenna system, which provides a theoretical tool for the prediction of channel models of MIMO, and is also the basis of wireless power transmission system One of the first books on electromagnetics that contains the general theory of relativity, which is needed in the design of mobile systems such as global positioning system (GPS) By summarising both engineering and theoretical electromagnetism in one volume, this book is an essential reference for practicing engineers, as well as a guide for those who wish to advance their analytical techniques for studying applied electrodynamics.