

Radiation And Microwave Techniques

In this book, a variety of topics related to electromagnetic fields and waves are extensively discussed. The topics encompass the physics of electromagnetic waves, their interactions with different kinds of media, and their applications and effects.

This reference examines innovations in separation science for improved sensitivity and cost-efficiency, increased speed, higher sample throughput and lower solvent consumption in the assessment, evaluation, and validation of emerging drug compounds. It investigates breakthroughs in sample pretreatment, HPLC, mass spectrometry, capillary electrophor

Combines theoretical concepts with experimental results on thermal microwave radiation to increase the understanding of the complex nature of terrestrial media. Emphasising on radiative transfer models, this book covers the terrestrial aspects, from clear to cloudy atmosphere, precipitation, ocean and land surfaces, vegetation, snow and ice.

Monopulse is a type of radar that sends additional information in the signal in order to avoid problems caused by rapid changes in signal strength. Monopulse is resistant to jamming which is one of the main reasons it is used in most radar systems today. This updated and expanded edition of an Artech House classic offers you a current and comprehensive treatment of monopulse radar principles, techniques, and applications. The Second Edition features two brand new chapters, covering monopulse countermeasures and counter-countermeasures and monopulse for airborne radar and homing seekers. This essential volume categorizes and describes the various forms of monopulse radar, and analyzes their capabilities and limitations. The book also devotes considerable space to monopulse circuits and hardware components, explaining their functions and performance. This practical resource features numerous photographs and illustrations drawn from actual radar systems and components. This book serves as a valuable reference for both experienced radar engineers and those new to the field.

Microwaves can be effectively used in the processing of industrial materials under a wide range of conditions. However, microwave processing is complex and multidisciplinary in nature, and a high degree of technical knowledge is needed to determine how, when, and where the technology can be most profitably utilized. This book assesses the potential of microwave technology for industrial applications, reviews the latest equipment and processing methods, and identifies both the gaps in understanding of microwave processing technology and the promising development opportunities that take advantage of this new technology's unique performance characteristics.

From engineering fundamentals to cutting-edge clinical applications This book examines the biological effects of RF/microwaves and their medical applications. Readers will discover new developments in therapeutic applications in such areas as cardiology, urology, surgery, ophthalmology, and oncology. The authors also present developing applications in such areas as cancer detection and organ imaging. Focusing on frequency ranges from 100 kHz to 10 GHz, RF/Microwave Interaction with Biological Tissues is divided into six chapters: * Fundamentals in Electromagnetics--examines penetration of RF/microwaves into biological tissues; skin effect; relaxation effects in materials and the Cole-Cole model (display); the nearfield of an antenna; blackbody radiation and the various associated laws; and microwave measurements. * RF/Microwave Interaction Mechanisms in Biological Materials--includes a section devoted to the fundamentals of thermodynamics and a discussion on energy and entropy. * Biological Effects--investigates the effects of radio frequency fields on the nervous system, the brain and spinal cord, the blood-brain barrier, and cells and membranes. * Thermal Therapy--includes a description of applicators and an extensive discussion on the foundation of dielectric heating and inductive heating. * EM-Wave Absorbers Protecting the Biological and Medical Environment--investigates materials for EM-wave absorbers from both a theoretical and applications perspective. Special attention is given to ferrite absorbers. * RF/Microwave Delivery Systems for Therapeutic Applications--begins with the fundamental features of major components used in RF/microwave delivery systems for therapeutic applications. New research towards the development of future measurement techniques is also presented. The book features problem sets at the end of each chapter, making it an excellent introduction for bioengineering and engineering students. Researchers, physicians, and technicians in the field will also find this an excellent reference that offers all the fundamentals, the most cutting-edge applications, and insight into future developments. An Instructor's Manual presenting detailed solutions to all the problems in the book is available from the Wiley editorial department.

This textbook provides a fundamental approach to RF and microwave engineering. It is unusual for the thoroughness with which these areas are presented. The effect is that the reader comes away with a deep insight not only of the design formulation but answers to how and why those formulations work. This is especially valuable for engineers whose careers involve research and product development, wherein the applicability of the applied principles must be understood. The scope of this book extends from topics for a first course in electrical engineering, in which impedances are analyzed using complex numbers, through the introduction of transmission lines that are analyzed using the Smith Chart, and on to graduate level subjects, such as equivalent circuits for obstacles in hollow waveguides, analyzed using Green's Functions. This book is a virtual encyclopedia of circuit design methods. Despite the complexity, topics are presented in a conversational manner for ease of comprehension. The book is not only an excellent text at the undergraduate and graduate levels, but is as well a detailed reference for the practicing engineer. Consider how well informed an engineer will be who has become familiar with these topics as treated in High Frequency Techniques: (in order of presentation) Brief history of wireless (radio) and the Morse code U.S. Radio Frequency Allocations Introduction to vectors AC analysis and why complex numbers and impedance are used Circuit and antenna reciprocity Decibel measure Maximum power transfer Skin effect Computer simulation and optimization of networks LC matching of one impedance to another Coupled Resonators Uniform transmission lines for propagation VSWR, return Loss and mismatch error The Telegrapher Equations (derived) Phase and Group Velocities The Impedance Transformation Equation for lines (derived) Fano's and Bode's matching limits The Smith Chart (derived) Slotted Line impedance measurement Constant Q circles on the Smith Chart Approximating a transmission line with lumped L's and C's ABCD, Z, Y and Scattering matrix analysis methods for circuits Statist

Physical Principles of Far-Infrared Radiation

Polymer science faces the challenge of meeting growing market demand for polymers whilst achieving sustainability through environmentally friendly processes. Microwave heating has emerged as a greener technique that accelerates a variety of chemical reactions, including polymerization. Microwave-assisted reactions can be cleaner and more rapid and economic analyses suggest that the cost of curing polymers may be reduced by switching over to the use of microwaves. This book provides comprehensive coverage

of microwave-assisted polymerization. The first chapter introduces readers to the theory behind the accelerating effects of microwaves on chemical reactions and covers the types of commercial microwave reactors being used for synthesis and processing of polymers that are available on the market. Subsequent chapters are organised by type of reaction, including radical homo and co-polymerizations, step growth polymerization and peptide synthesis. Importantly, analysis of processes and product properties in comparison with conventional methods is also detailed. This book will be a valuable resource for green chemists and polymer scientists and engineers who want to develop sustainable processes.

The quantum Hall effect, low-dimensional systems, vortices and superconductivity, high-resolution NMR and EPR spectroscopy - all these and many other landmark contributions of high-magnetic-field physics to solid state science, analytical chemistry and structural biology are presented in this book. Each chapter describes the key concepts and future prospects in the corresponding field. The text can be read at different levels: researchers will find depth and insight, while students will come to understand the basic concepts. This book, written by leading scientists, will serve as a reference work on high-magnetic-field science for many years to come.

This volume is a review of the trends in the field of radiation chemistry research. It covers a broad spectrum of topics, ranging from the historical perspective, instrumentation of accelerators in the nanosecond to femtosecond region, through the use of radiation chemical methods in the study of antioxidants and nanomaterials, radiation-induced DNA damage by ionizing radiation involving both direct and indirect effects, to ultrafast events in free electron transfer, radiation-induced processes at solid-liquid interfaces and the recent work on infrared spectroscopy and radiation chemistry. The book is unique in that it covers a wide spectrum of topics that will be of great interest to beginners as well as experts. Recent data on ultrafast phenomena from the recently established world-class laser-driven accelerators facilities in the US, France and Japan are reviewed.

Humanity's ability to produce enough food is mostly due to adoption of new methods and technologies by the agricultural industries as they became available. New information, communication and high speed processing and precision agriculture technologies have the potential to transform the agricultural industry. These technologies incorporate radio-frequency and microwave radiation into their systems. This book presents an overview of how these technologies are being used in agricultural systems. The main purpose of the book is to provide a glimpse of what is possible and encourage practitioners in the engineering and agricultural industries to explore how radio-frequency and microwave systems might further enhance the agricultural industry. The authors have extensive experience in agricultural and microwave engineering, instrumentation and communication systems. The objective of this study is to evaluate the chemical stability of reconstituted cefotaxime sodium frozen and thawed by other conventional or microwave techniques.

Microwave Techniques Handbook of Microwave Techniques and Equipment Prentice Hall Thermal Microwave Radiation Applications for Remote Sensing IET

The study of the earth's climate requires reliable global data sets to validate numerical simulation models and to identify regional and global fluctuations and trends. This book presents ways to obtain such data from space-borne and ground-based measurements, both passive and active, over the entire electromagnetic spectrum. It describes the basics of such methods together with the most recent advancements and spans the field from clouds and the planetary radiation budget to surface processes and ocean properties. Each subject is backed by extensive reference lists to enable readers to probe more deeply.

During the last 35 years, there has been considerable development and increase in the number of devices that emit nonionizing radiant energies. These energies such as radiofrequency including microwaves are used in all sectors of our society for military, industrial, telecommunications, medical, and consumer applications. This increase in sources of nonionizing radiant energies has resulted in growing interest on the part of government regulatory agencies, industrial and military physicians, research workers, clinicians, and environmentalists. Although there is information on biologic effects and potential hazards to man from exposure to microwave/radiofrequency energies, considerable confusion and misinformation has permeated not only the public press but also some scientific and technical publications. Because of the complexity of the interactions of nonionizing radiation in biological systems, an inter-disciplinary approach is necessary to assess and elucidate the problems that evolve as this field advances and as the use of these energies expands. It is important to maintain a proper perspective and assess realistically the biomedical effects of these radiant energies so that the worker or general public will not be unduly exposed nor will research, development and beneficial utilization of these energies be hampered or restricted by an undue concern for effects which may be nonexistent or minimal in comparison to other environmental hazards.

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