

Antennas And Radio Propagation

Antennas and radio propagation are continuously and rapidly evolving and new challenges arise every day. As a result of these rapid changes the need for up-to-date texts that address this growing field from an interdisciplinary perspective persists. This book, organized into nine chapters, presents new antenna designs and materials that will be used in the future, due to the trend for higher frequencies, as well as a bird's eye view of some aspects related to radio propagation channel modeling. The book covers the theory but also the practical aspects of technology implementation in a way that is suitable for undergraduate and graduate-level students, as well as researchers and professional engineers.

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

ELECTRONIC FUNDAMENTALS SERIES The manuals on electronic fundamentals form a progressive series of educational texts which present the theory and application of electronics for the military services. The series starts with the basic electrical fundamentals and extends to the most recent technical concepts, as applied to telegraphy, telephony, radio, loran, facsimile, radio direction finding, radar, meteorological radio, television, and other military equipments. See SR 310-20-4 for published, available manuals in this series. CONTENTS CHAPTER 1. INTRODUCTION Section I. The electromagnetic wave II. Wave propagation III. Summary and review questions CHAPTER 2. MODES OF PROPAGATION Section I. Ground-wave propagation II. The ionosphere III. Sky-wave propagation IV. Summary and review questions CHAPTER 3. HALF-WAVE AND QUARTER-WAVE ANTENNAS Section I. Basic theory II. Transmission lines III. Basic feeder systems IV. Basic radiation patterns V. Practical half-wave antennas VI. Grounded antennas VII. Summary and review questions CHAPTER 4. LONG-WIRE ANTENNAS 5. DRIVEN AND PARASITIC ARRAYS Section I. Introduction II. Driven arrays III. Parasitic arrays IV. Summary and review questions CHAPTER 6. RADIO DIRECTION FINDING ANTENNAS INDEX

An introduction to RF propagation that spans all wireless applications This book provides readers with a solid understanding of the concepts involved in the propagation of electromagnetic waves and of the commonly used modeling techniques. While many books cover RF propagation, most are geared to cellular telephone systems and, therefore, are limited in scope. This title is comprehensive—it treats the growing number of wireless applications that range well beyond the mobile telecommunications industry, including radar and satellite communications. The author's straightforward, clear style makes it easy for readers to gain the necessary background in electromagnetics, communication theory, and probability, so they can advance to propagation models for near-earth, indoor, and earth-space propagation. Critical topics that readers would otherwise have to search a number of resources to find are included: * RF safety chapter provides a concise presentation of FCC recommendations, including application examples, and prepares readers to work with real-world propagating systems * Antenna chapter provides an introduction to a wide variety of antennas and techniques for antenna analysis, including a detailed treatment of antenna polarization and axial ratio; the chapter contains a set of curves that permit readers to estimate polarization loss due to axial ratio mismatch between transmitting and receiving antennas without performing detailed calculations * Atmospheric effects chapter provides curves of typical atmospheric loss, so that expected loss can be determined easily * Rain attenuation chapter features a summary of how to apply the ITU and Crane rain models * Satellite communication chapter provides the details of earth-space propagation analysis including rain attenuation, atmospheric absorption, path length determination and noise temperature determination Examples of widely used models provide all the details and information needed to allow readers to apply the models with confidence.

References, provided throughout the book, enable readers to explore particular topics in greater depth. Additionally, an accompanying Wiley ftp site provides supporting MathCad files for select figures in the book. With its emphasis on fundamentals, detailed examples, and comprehensive coverage of models and applications, this is an excellent text for upper-level undergraduate or graduate students, or for the practicing engineer who needs to develop an understanding of propagation phenomena.

Radio Frequency Energy: Background; Electromagnetic sources; Simple antennas; More complex antennas; Antennas using conducting surfaces; Specialised antennas; Summary. Moving Quanta from Place to Place: Introduction to Various Propagation Environments; Describing the Earth's Atmosphere; The Troposphere; Reflection; Where We Live; Near Earth Propagation; Radio Propagation in a Complex Urban Environment; Sky-wave Propagation; Artificial Sky-wave Propagation; Summary; Index; Appendix: Feeders.

Market_Desc: Students - senior undergraduate and postgraduate Wireless communications engineers and antenna designers University lecturers Special Features: This authoritative second edition features the following updates, enabling this reference to remain a leading text in the area: · New chapter entitled Channel Measurements for Mobile Radio Systems· Fully revised and expanded exercises in each chapter· Solutions manual for access by course tutors· Presentation slides for revised contents will also be available online About The Book: Antennas and propagation are the key factors influencing the robustness and quality of the wireless communication channel. This book introduces the basic concepts and specific applications of antennas and propagation to wireless systems, covering terrestrial and satellite radio systems in both mobile and fixed contexts. It is a vital source of information for wireless communication engineers as well as for students at postgraduate or senior undergraduate levels.

It is from the hands-on perspective of a lifelong ham radio operator turned professional "RF and antenna guy" that this book is written. The intense mathematical treatment given in most antenna handbooks is more befuddling than enlightening for many. So

in this book the intuitive is emphasized and mathematics is minimized. The purpose of this book is to provide a basic understanding of antennas and radio propagation. The characteristics of many antenna types are discussed to help the reader determine which might be appropriate for a given situation. Cookbook type recipes are given for building selected antenna types although the real intent is to provide enough basic understanding so that the interested readers can select an appropriate antenna for their application and then design and build it for themselves. More than anything this book is intended to give the reader a basic understanding of what radio waves are, how they behave, and insight to the creative thought processes used to build the antennas that launch and receive them.

This book emerged from teaching a graduate level course in propagation and smart antennas at the Naval Postgraduate School. In its present form, it is suitable not only as a graduate level text, but also as a reference book for industry and research use. The area of radiowave propagation and smart antennas is highly interdisciplinary, extracting material from electromagnetics, communications, and signal processing. This book is useful to workers in electromagnetics who would like to supplement their background with relevant communicational aspects and to workers in communications who would like to supplement their background with relevant electromagnetic aspects. Anyone with a basic understanding of probability, wave propagation, digital communications, and elementary signal processing should be able to appreciate the contents of the book. The book consists of nine chapters with several worked out examples dispersed throughout. Chapter 1 covers the basics of cellular communications. Chapter 2 covers the basic principles of electromagnetic wave propagation relevant to path loss predictions in wireless communications. Students with little prior background in electromagnetics should find the first few sections of Chapter 2 self-sufficient. Empirical path loss models that are used in system design are treated in Chapter 3. The chapter includes the traditional models as well as some of the newer models. Chapter 4 has a thorough discussion on the causes and characterization of small scale fading. The topic of spatial correlation that is very important for antenna arrays is discussed there in detail.

The contents of this book are mostly aimed at the amateur radio beginner and aspiring ones. Therefore, this book provides answers to basic questions like: What is the best HF antenna for my needs and location? What type of stand-alone antenna tuner should I use and which should I avoid? How can I hide my HF antenna from the neighbors and still get acceptable performance from it? What about lightning protection? This book will supply immediately useful answers to the above questions and many more. A properly designed and installed amateur radio HF antenna system can potentially make the humblest ham radio equipment perform like stations worth thousands of dollars. We are confident that the antenna experimenter will find the information given here priceless. Furthermore, any ham radio operator, armed with the information this book contains, will become a much better informed buyer of commercially made HF antenna systems and accessories. This special compendium edition is published in response to ham radio operators who wrote to ask that all the basic information, on and related to amateur radio HF antennas, be made available in one book instead of four, arguing that it would be more convenient. The author and publisher agree. Therefore this edition contains the complete four-book series on Amateur Radio HF Antennas published by Claude Jollet, VE2DPE.

Offers a comprehensive introduction to the practice and underpinnings of personal communications. This book contains chapters that explain how the ultra-wide band technology affects various aspects of personal communications. It covers important innovations such as wireless local networks, personal networks, and MIMO techniques.

Now in a newly updated and revised edition, this timely resource provides you with complete and current details on the theory, design, and applications of wireless antennas for on-body electronic systems. The Second Edition offers readers brand new material on advances in physical phantom design and production, recent developments in simulation methods and numerical phantoms, descriptions of methods for simulation of moving bodies, and the use of the body as a transmission channel. You also find a completely revised chapter on channel characterization and antenna design at microwave frequencies. This cutting-edge volume brings you the state-of-the-art in existing applications like Bluetooth headsets together with detailed treatment of techniques, tools, and challenges in developing on-body antennas for an array of medical, emergency response, law enforcement, personal entertainment, and military applications on the horizon. The book briefs you on energy propagation around and into the body and how to estimate performance of on-body wireless links, and then dives into the nuts-and-bolts of designing antenna systems that deliver the goods. It covers on-body communication channels at microwave frequency bands and at low frequency bands, as well as ultra wideband systems for WPANs and WBANs. You get details on body-centric UWB antennas and channels, as well as advances in wearable mobile, EBG, and "smart fabric" antennas for cellular and WLAN communications. Chapters on telemedicine applications, such as remote diagnoses, and implantable medical devices cover crucial propagation issues and other obstacles that need to be addressed. Rounding out the coverage is a section on antenna design for body-sensor networks and their emerging military and space applications. Packed with hands-on guidance from noted experts, this volume will be indispensable for your efforts in designing and improving body-centric communication systems.

This book describes the physical mechanisms involved in the propagation of electromagnetic waves in the radiofrequency range, inside and outside buildings, in the terrestrial and near space environments, with a special focus on mobile radio communication. It combines a theoretical and an experimental approaches with an understanding of the physical environment through adequate formulations of the laws of electromagnetism. It should thus provide the background needed by advanced students and development engineers for the conception of high quality and reliable telecommunication systems.

Antennas and Wave Propagation is written for the first course on the same. The book begins with an introduction that discusses the fundamental concepts, notations, representation and principles that govern the field of antennas. A separate chapter on mathematical preliminaries is discussed followed by chapters on every aspect of antennas from Maxwell's equations to antenna array analysis, antenna array synthesis, antenna measurements and wave propagation.

THE DEFINITIVE ANTENNA REFERENCE--FULLY REVISED AND EXPANDED! Design and build your own antennas with the help of this unique guide. Updated and revised to provide clear answers to questions frequently asked by hobbyists and electronics technicians, Practical Antenna Handbook, Fifth Edition blends theoretical concepts with hands-on experience--requiring only high school mathematics Reorganized to flow logically from broad physical principles to specific antenna design and construction techniques, the book begins by covering the fundamentals. Then the half-wave dipole is discussed both as an excellent antenna in its own right and as a conceptual tool for predicting the performance of other designs. Transmission line impedance matching techniques--and a companion Smith chart tutorial--lead into "must have" accessories for tuning, monitoring, and troubleshooting antenna system performance. Other tools, such as antenna modeling software and network analyzer add-ons for PCs and Macs, are addressed, and concluding chapters offer fresh insights into support structures and installation techniques. NEW TOPICS COVERED INCLUDE: Characteristics of all-driven and parasitic arrays Beverages and small MF/HF receiving loops Top-loaded shunt-fed towers and other verticals Theory and design of Yagi beams Effect of real ground on propagation and antenna patterns, impedance, and efficiency Lightning protection and four kinds of ground systems Zoning and restrictive covenants COVERS A WIDE VARIETY OF ANTENNAS: Dipoles and inverted-Vs Quads, delta, and NVIS loops Wire arrays (bobtail curtain, half-square, rhombic) Verticals and shunt-fed towers Rotatable Yagi beams MF/HF receiving antennas (flag, pennant, K9AY, Beverage) Mobile and portable antennas VHF/UHF/microwave antennas And many more GO TO WWW.MHPROFESSIONAL.COM/CARR5 FOR: * Tables of worldwide geographic coordinates and antenna dimensions vs. frequency * Supplier updates * Author's blog * Additional photographs and schematics * Links to tutorials and specialized calculators

Radio Propagation and Adaptive Antennas for Wireless Communication Networks, 2nd Edition, presents a comprehensive overview of wireless communication system design, including the latest updates to considerations of over-the-terrain, atmospheric, and ionospheric communication channels. New features include the latest experimentally-verified stochastic approach, based on several multi-parametric models; all-new chapters on wireless network fundamentals, advanced technologies, and current and modern multiple access networks; and helpful problem sets at the conclusion of each chapter to enhance clarity. The volume's emphasis remains on a thorough examination of the role of obstructions on the corresponding propagation phenomena that influence the transmission of radio signals through line-of-sight (LOS) and non-line-of-sight (NLOS) propagation conditions along the radio path between the transmitter and the receiver antennas—and how adaptive antennas, used at the link terminals, can be used to minimize the deleterious effects of such obstructions. With its focus on 3G, 4G, MIMO, and the latest wireless technologies, Radio Propagation and Adaptive Antennas for Wireless Communication Networks represents an invaluable resource to topics critical to the design of contemporary wireless communication systems. Explores novel wireless networks beyond 3G, and advanced 4G technologies, such as MIMO, via propagation phenomena and the fundamentals of adapted antenna usage. Explains how adaptive antennas can improve GoS and QoS for any wireless channel, with specific examples and applications in land, aircraft and satellite communications. Introduces new stochastic approach based on several multi-parametric models describing various terrestrial scenarios, which have been experimentally verified in different environmental conditions New chapters on fundamentals of wireless networks, cellular and non-cellular, multiple access networks, new applications of adaptive antennas for positioning, and localization of subscribers Includes the addition of problem sets at the end of chapters describing fundamental aspects of wireless communication and antennas.

Radio Propagation and Antennas A Non-Mathematical Treatment of Radio and Antennas

Radiowave Propagation in Communications was written with two basic objectives: (1) to present an up-to-date review of the major radiowave propagation phenomena which hinder reliable space communications, and (2) to describe how these propagation phenomena affect the design and performance of satellite communications systems. Earth-orbiting satellites are employed extensively for the relay of information in a vast array of telecommunications, meteorological, government, and scientific applications. Satellite systems rely on the transmission of radiowaves to and from the satellite and are dependent on the propagation characteristics of the transmission path, primarily the earth's atmosphere. Radiowave propagation thus plays a very important part in the design and ultimate performance of space communications systems. This book presents, for the first time, the meshing in a single publication of the fundamentals of radiowave propagation factors with a discussion of the practical consequences of these factors on satellite communications systems. Two major subfields are involved in this book. Radiowave propagation, which is basically applied electromagnetic theory, provides the theory and analytical tools for the first several chapters. Later chapters then apply propagation effects to the field of electrical engineering involved with satellite communications. The material progresses from the essential aspects of radiowave propagation to the application of practical methods and techniques in the design and performance of satellite communications systems.

In the offered book the fundamentals of electromagnetic fields and waves are discussed based on the great Maxwell equations. The book is conceived as a textbook for serious technical and classical universities in the considered themes. Nevertheless, it can be used, of course, as the reference book for wide group of engineers, researchers and practical experts. Material of this book is divided into four main parts connected between them. The first part (Fundamental of Electrodynamics) is devoted to explanation of Maxwell equations and methods of its solutions. Besides classical interpretation the generalized equations are discussed, which take into consideration the scalar magnetic fields. New approaches allow description of so-called longitudinal electromagnetic waves, which have the absolutely non-standard propagation properties, and permit to explain various electrodynamics paradoxes, which cannot be explained in another way. The main characteristics of wave processes in the free space and in transmission lines (feeders) are described. The second part (Radio Wave Propagation) investigates the obvious patterns of diffraction and interference phenomena at radio wave propagation for the obstacle presence in the propagation track, which is typical for all practical situations. Radio wave propagation of various frequency ranges is fulfilled separately taking into consideration the specific features of reflections from the atmosphere parts, attenuation in different media, types of propagating waves, multipath effects, diffraction and non-standard conditions of obstacle overcoming including non-usual ways of atmosphere ducts. The third part is devoted to description of various types and antennas, beginning from simplest (vibrators) and ending by complicated adaptive antenna arrays. Description is fulfilled on the reviewing level with many obvious figures, not to rely on strict mathematical

methods, but rather on the concept level. Fourth part includes description of UHF devices, which are the elements' base of UHF devices including surface and bulk integrated UHF circuits. These results have in many aspects the pioneer character and they are not widely known to experts. Distinctive feature of the offered book is sufficiently simplifies description of the very complicated electrodynamic problems available for the modern students and for young engineers. Of course, it is impossible to deal without mathematics in these areas but required mathematics can be replaced by the many patterns, which give the chance to understand problems and to determine the complex questions. Sample Chapter(s) Chapter1: GENERAL DEFINITIONS AND RELATIONS OF ELECTRODYNAMICS (498 KB)Contents:FRONT MATTERCHAPTER 1. GENERAL DEFINITIONS AND RELATIONS OF ELECTRODYNAMICSCHAPTER 2. ELECTROMAGNETIC FIELDS AND WAVESCHAPTER 3. MAIN PHYSICAL PHENOMENA AT RADIO WAVES PROPAGATIONCHAPTER 4. PROPAGATION OF RADIO WAVES OF DIFFERENT RANGES AND ITS APPLICATION AREASCHAPTER 5. PRINCIPAL CHARACTERISTICS OF ANTENNASCHAPTER 6. ANTENNAS OF DECIMILLIMETER, MILLIMETER AND CENTIMETER WAVESCHAPTER 7. ANTENNAS OD DECIMETER, METER AND DECAMETER WAVESCHAPTER 8. ANTENNAS OF HECTOMETER, KILOMETER MYRIAMETER WAVESCHAPTER 9. ANTENNAS FOR TV, RADIO RELAY AND SPACE COMMUNICATION LINESCHAPTER 10. ELECTROMAGNETIC COMPATIBILITY OF RADIO ENGINEERING SYSTEMS. ANTENNAS AND THE PROBLEM OF ITS MINIATURIZATIONCHAPTER 11. MAIN COMPONENTS OF THE ELEMENT BASE OF ANTENNA-FEEDER ENGINEERINGCHAPTER 12. BASE ELEMENTS AND FUNCTIONAL UNITS OF ANTENNA- FEEDER ENGINEERINGBACK MATTERReadership: The book is conceived as a textbook for serious technical and classical universities in the considered themes. Nevertheless, it can be used, of course, as the reference book for wide group of engineers, researches and practical experts.

Contents: Basic properties of antennas and radio waves; Antenna-feeder arrangements; Propagation of radio waves and application of them for radio communications; General form and basic data of certain antennas; Intensity of field of surface radio waves depending on distance and working frequency for calculated antenna; Radio weather forecast.

This completely updated second edition of an Artech House classic provides a thorough introduction to the basic principles of electromagnetic wave propagation of radio frequencies in real-world conditions, fully updated by including new achievements in theory and technology. It serves as an invaluable daily reference for practitioners in the field and as a complete, organized text on the subject. This comprehensive resource covers a wide range of essential topics, from the classification of radio waves, electromagnetic wave theory, and antennas for RF radio links, to the impact of the earth surface on the propagation of ground waves, atmospheric affects in radio wave propagation, and radio wave reception. The book explores the propagation of the ground radio waves, namely the waves that propagate in vicinity of the earth's surface (e.g., guided by that interface), without involvement of any atmospheric effects. Specifics of the high-frequency (HF) radio propagation due to reflections from ionospheric layers is studied, based on commonly used models of the ionospheric vertical profiles. Scattering of the radio waves of UHF and higher frequency bands from the random variations of the tropospheric refraction index (from tiny air turbulences) are also considered by using the principles of statistical radio-physics. Analysis of propagation conditions on real propagation paths, including analysis of the power budget of the VHF/UHF link to assure its stability (percentage of availability within observation time frame), terrestrial, broadcast, mobile, and satellite RF links are presented. The engineering design of the cellular networks, including LTE 4G, 5G and upcoming higher generations is explored. HF propagation predictions for extremely long-range links design for commercial and military applications are explained. Packed with examples and problems, this book provides a theoretical background for astrophysical, aeronomy and geophysical instrumentation design.

This work treats the essential elements of radio wave propagation without requiring recourse to advanced electromagnetic concepts and equations. However, it provides sufficient detail to allow those concerned with wireless systems to acquire quickly a practical working knowledge of the important concepts. Radio wave propagation is placed in a practical context by considering the design aspects of communications systems at microwave frequencies. A fuller consideration of the electromagnetic properties of materials is given late in the book rather than as an introductory chapter.

Good, No Highlights, No Markup, all pages are intact, Slight Shelfwear, may have the corners slightly dented, may have slight color changes/slightly damaged spine.

This text book on "Antennas and Radio-wave Propagation" describes the theory of various types of antennas that are in current use and the way in which the radiated waves get propagated through space. The theory has been written in a simple and easy-to-understand language. Lots of worked-out examples as well as diagrams in 2-D and 3-D have been included to illustrate the principles clearly. It is hoped that these features help the students to grasp the theories involved easily. Features Provided solid grasp of the subject. Every concept is explained in detail with 2 dimension or 3 dimension figures wherever necessary. Every chapter is fortified with lots of worked examples. Each chapter ends with review questions and exercise problems to allow the student to test their understanding of the material covered. Basic principles on antenna and special antennas are discussed in appendices Contents Antenna Basics Point Sources Antenna Arrays Electric Dipole and Thin Linear Antennas The Loop Antenna The Helical Antenna and the Yagi-Ud array Antenna Types Propagation of Ground and Space Waves Sky-Wave Propagation Appendices.

It is from the hands-on perspective of a lifelong ham radio operator turned professional "RF and antenna guy" that this book is written. The intense mathematical antenna descriptions given in most antenna handbooks is more befuddling than enlightening for many. So in this book the intuitive is emphasized and mathematics is minimized, though many formulas are given to calculate selected parameters if desired. The purpose of this book is to provide a basic understanding of antennas and radio propagation for both professionals and amateurs alike. Many of the technical explanations were developed for a 5-day antenna course in which the requirement was to take students from zero to antennas in one week. The characteristics of many antenna types are discussed and construction recipes are given for building selected antenna types. The intent is to provide enough basic understanding so that the interested readers can select an appropriate antenna for their application and then design and build one for themselves. More than anything this book is intended to give the reader a basic understanding of what radio waves are, how they behave, and insight to the creative thought processes used to build the antennas that launch and receive them.

TM 11-666 Antennas And Radio Propagation 1953-02-09 ELECTRONIC FUNDAMENTALS SERIES The manuals on electronic fundamentals form a progressive series of educational texts which present the theory and application of electronics for the military services. The series starts with the basic electrical fundamentals and extends to the most recent technical concepts, as applied to telegraphy, telephony, radio, loran, facsimile, radio direction finding, radar, meteorological radio, television, and other military equipments. See SR 310-20-4 for published, available manuals in this series. CONTENTS CHAPTER 1. INTRODUCTION Section I. The electromagnetic wave II. Wave propagation III. Summary and review questions CHAPTER 2. MODES OF PROPAGATION Section I. Ground-wave propagation II. The ionosphere III. Sky-wave propagation IV. Summary and review questions CHAPTER 3. HALF-WAVE AND QUARTER-WAVE ANTENNAS Section I. Basic theory II. Transmission lines III. Basic feeder systems IV. Basic radiation patterns V. Practical half-wave antennas VI. Grounded antennas VII. Summary and review questions CHAPTER 4. LONG-WIRE ANTENNAS 5. DRIVEN AND PARASITIC ARRAYS Section I. Introduction II. Driven arrays III. Parasitic arrays IV. Summary and review questions CHAPTER 6. RADIO DIRECTION FINDING ANTENNAS

This comprehensive guide helps readers understand the theory and techniques needed to analyze and model radio wave propagation in complex environments. All of the essential topics are covered, from the fundamental concepts of radio systems, to complex propagation phenomena. These topics include diffraction, ray tracing, scattering, atmospheric ducting, ionospheric ducting, scintillation, and propagation through both urban and non-urban environments. Emphasis is placed on practical procedures, with detailed discussion of numerical and mathematical methods providing readers with the necessary skills to build their own propagation models and develop their own techniques. MATLAB functions illustrating key modeling ideas are provided online. This is an invaluable resource for anyone wanting to use propagation models to understand the performance of radio systems for navigation, radar, communications, or broadcasting.

Antennas and propagation are of fundamental importance to the coverage, capacity and quality of all wireless communication systems. This book provides a solid grounding in antennas and propagation, covering terrestrial and satellite radio systems in both mobile and fixed contexts. Building on the highly successful first edition, this fully updated text features significant new material and brand new exercises and supplementary materials to support course tutors. A vital source of information for practising and aspiring wireless communication engineers as well as for students at postgraduate and senior undergraduate levels, this book provides a fundamental grounding in the principles of antennas and propagation without excessive recourse to mathematics. It also equips the reader with practical prediction techniques for the design and analysis of a very wide range of common wireless communication systems. Including: Overview of the fundamental electromagnetic principles underlying propagation and antennas. Basic concepts of antennas and their application to specific wireless systems. Propagation measurement, modelling and prediction for fixed links, macrocells, microcells, picocells and megacells Narrowband and wideband channel modelling and the effect of the channel on communication system performance. Methods that overcome and transform channel impairments to enhance performance using diversity, adaptive antennas and equalisers. Key second edition updates: New chapters on Antennas for Mobile Systems and Channel Measurements for Mobile Radio Systems. Coverage of new technologies, including MIMO antenna systems, Ultra Wideband (UWB) and the OFDM technology used in Wi-Fi and WiMax systems. Many new propagation models for macrocells, microcells and picocells. Fully revised and expanded end-of-chapter exercises. The Solutions Manual can be requested from http://www.wiley.com/go/saunders_antennas_2e

This exceptional book introduces the reader to the principles, theory and applications of physical layer wireless/mobile communications, applicators and millimetric antennas.

Aimed at a single-semester course on antennas at the undergraduate level, Antennas and Wave Propagation provides a lucid explanation of the fundamentals of antennas and propagation. This student-friendly text also includes simple design procedures along with a large number of examples and exercises.

Joe Carr has provided radio amateurs and short-wave listeners with the definitive design guide for sending and receiving radio signals with Antenna Toolkit 2nd edition. Together with the powerful suite of CD software, the reader will have a complete solution for constructing or using an antenna - bar the actual hardware! The software provides a simple Windows-based aid to carrying out the design calculations at the heart of successful antenna design. All the user needs to do is select the antenna type and set the frequency - a much more fun and less error prone method than using a conventional calculator to solve formulae. The new edition has been revised to include further cases of propagation, additional antennas and also two new chapters - Small Loop Antennas (a topic of considerable interest, which has been the subject of much recent debate in the amateur radio press); and Yagi Beam Antennas (widely used at HF and VHF). The CD software has also been updated. Joe Carr's expertise in the area of antenna design is legendary. Antenna designers, whether hobbyist or technician, can be assured they need look no further than Antenna Toolkit for the complete guide to understanding the practicalities of using and designing antennas today. A complete solution for antenna design in one package. Includes free CD-ROM with state of the art software for all design calculations. The definitive guide to antenna design for radio amateurs and short-wave listeners.

An accessible student-oriented approach to radiowave propagation Propagation-the process whereby a signal is conveyed between transmitter and receiver-has a profound influence on communication systems design. Radiowave Propagation provides an overview of the physical mechanisms that govern electromagnetic wave propagation in the Earth's troposphere and ionosphere. Developed in conjunction with a graduate-level wave propagation course at The Ohio State University, this text offers a balance of physical and empirical models to provide basic physical insight as well as practical methods for system design. Beginning with discussions of propagation media properties, plane waves, and antenna and system concepts, successive chapters consider the most important wave propagation mechanisms for frequencies ranging from LF up to the millimeter wave range, including: Direct line-of-sight propagation through the atmosphere Rain attenuation The basic theory of reflection and refraction at material interfaces and in the Earth's atmosphere Reflection, refraction, and diffraction analysis in microwave link design for a specified terrain profile Empirical path loss models for point-to-point ground links Statistical fading models Standard techniques for prediction of ground wave propagation Ionospheric propagation, with emphasis on the skywave mechanism at MF

and HF and on ionospheric perturbations for Earth-space links at VHF and higher frequencies A survey of other propagation mechanisms, including tropospheric scatter, meteor scatter, and propagation effects on GPS systems Radiowave Propagation incorporates fundamental materials to help senior undergraduate and graduate engineering students review and strengthen electromagnetic physics skills as well as the most current empirical methods recommended by the International Telecommunication Union. This book can also serve as a valuable teaching and reference text for engineers working with wireless communication, radar, or remote sensing systems.

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