Microstrip Antennas The Analysis And Design Of Arrays

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.

Today, the state of the art antenna technology allows the use of different types and models of antennas, depending on the area of application considered. The rapid progress in wireless communications requires the development of lightweight, low profile, small size, flush-mounted and wideband multi-frequency planar antennas. This book reviews recent advances in designs of various microstrip patch antenna configurations. Microstrip patch antennas have been widely used in the range of microwave frequencies over the past twenty-five years, and over the past few years, single-patch antennas have been extensively used in various communication systems due to their compactness, economical efficiency, light weight, low profile and conformability to any structure. The main drawback to implementing these antennas in many applications is their limited bandwidth. However, the most important challenge in microstrip antenna design is to increase the bandwidth and gain. Theoretical study of various patch antenna configurations will be carried out in this book. The study is performed by using full wave analysis and analytical techniques for the characterization of these structures. Several techniques are used in this book to achieve multi-band performances such as multilayer stacked patches, multiple patches and insertion of slots of different shapes and sizes in the patch antennas. In addition, some novel patch antenna designs for modern applications are given, and some challenges of patch antenna designs are addressed. This book is divided into seven chapters and presents new research in this dynamic field.

The design of antenna arrays involves, amongst others, the selection of the array elements and geometry, as well as the element excitations. The feeding network to obtain the desired excitations can become quite complex, and hence expensive. One possible alternative would be to make use of micros trip wire-grid antenna arrays. These arrays are composed of staggered interconnected rectangular loops of dimensions a half wavelength by a wavelength (in the presence of the dielectric). It is because the short sides are considered to be discrete elements fed via micros trip transmission lines, that these antennas are viewed as arrays. While considerable success has been achieved in the design of these antennas, published work has been either of an entirely experimental nature or based on approximate (albeit clever) network models which do not allow for fine control of the array element excitations or off-centre-frequency computations generally. It is the purpose of this thesis to perform an almost rigorous numerical analysis of these arrays in order to accurately predict their element excitations. Models used to study microstrip antennas range from simplified ones, such as transmission-line models up to more sophisticated and accurate integral-equation models. The mixed-potential integral equation formulation is one of these accurate models which allows for the analysis of arbitrarily shaped microstrip antennas with any combination of frequency and dielectric thickness. The model treats the antenna as a single entity so that physical effects such as radiation, surface waves, mutual coupling and losses are automatically included. According to this formulation, the microstrip antenna is modelled by an integral equation which is solved using the method of moments. By far the most demanding part of the integral equation analysis is its actual numerical implementation. For this reason a complete description of the numerical implementation of the formulation is given in this thesis. To verify the accuracy of the implementation, rectangular microstrip patch antennas were analysed and surface current distributions were shown to compare favourably with published results. The formulation is then applied to the analysis of micros trip wire-grid antenna arrays which makes it possible to accurately predict surface current distributions on these arrays. Radiation patterns are determined directly from computed current distributions in the presence of the dielectric substrate and groundplane, and are essentially exact except for finite groundplane effects. To verify theoretically predicted results for wire-grid antenna arrays, several arrays were fabricated and actual radiation patterns were measured. Good correspondence between measured and predicted co-polar radiation patterns was found, while the overall cross polarization behaviour in cases with large groundplanes could also be predicted. The fact that numerical experimentation can be performed on wire-grid antenna arrays to examine element excitations, means that it is now possible to carefully design for some desired aperture distribution.

Analysis of Microstrip Antennas on Substrates with High Permeability

Analysis and Modeling of Microstrip Antennas with Electromagnetically Couple Feeds

Microstrip Antenna Design for Wireless Applications

Theoretical Studies of Microstrip Antennas. Volume II. Analysis and Synthesis of Multi-Frequency Elements

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

Increasing demand for commercial applications requiring small, low-cost, easy-to-use RF/microwave systems is driving innovations in antenna technology. This "how-to" book explains why microstrip antennas are the solution for the future.

"This anthology combines 15 years of microstrip antenna technology research into one significant volume and includes a special introductory tutorial by the co-editors. Covering theory, design and modeling techniques and methods, this source book is an excellent reference tool for engineers who want to become more familiar with microstrip antennas and microwave systems. Proven antenna designs, novel solutions to practical design problemsand relevant papers describing the theory of operation and analysis of microstrip antennas are contained within this convenient reference."

Microstrip and Printed Antenna Design, 2nd Edn

Handbook of Microstrip Antennas

Analysis of an Aperture Coupled Microstrip Antenna

Microstrip Antennas Modeling for Recent Applications

Volume 1 of Theoretical Studies of Microstrip Antennas deals with general design techniques and analyses of single and coupled radiating elements. Specifically, we review and then employ an important equivalence theorem that allows a pair of vector potentials, A-bar and A-bar-star to be calculated from fields tangential to any surface enclosing all currents and charges. These potentials serve to calculate the far fields, from which radiation conductance and pattern can be obtained. For rectangular microstrip patch antennas, we develop novel approximations so as to include the effects of currents induced on the ground planes by fringing fields. Coupling between two patches sharing the same substrate and ground plane, or else employing separate ones stacked one above the other, is also considered by means of a novel approximation that helps provide physical insight with respect to field patterns, coupling between patches and the like. As an important by-product of this work, several new approxiamte formulas are obtained that very accurately predict the electrical characteristics of microstrip transmission lines of arbitrary width and substrate thickness when the dielectric constant of the substrate is also arbitrary. Volume II of this report is devoted to the analysis and synthesis of multiresonant elements with emphasis on dual-frequency operation of rectangular microstrip patch antennas with or without external matching networks. (Author).

In the past few years, the concept of creating microwave antennas using microstrip has attracted increasing attention and viable practical designs are now emerging. The purpose of this monograph is to present the reader with an appreciation of the underlying physical action, up-to-date theoretical treatments, useful antenna design approaches and the overall state-of-the-art situation. The emphasis is on antenna engineering design, but to achieve this goal it has been necessary to delve into the behaviour of microstrip in a much wider sense and also include aspects of electromagnetic analysis. As a consequence, the monograph will also be of interest to microstrip circuit designers and to some extent those seeking electromagnetic problems of a challenging nature. The astronomical progress in miniaturising and integrating electronic circuits in the past decade has recently crerated a positive demand for a new generation of antenna systems. In principle, microstrip antennas are thin planar configurations that are leightweight, low cost, easy to manufacture and can be made conformal with the surfaces of vehicles, missiles etc. The compatibility of microstrip antennas with integrated electronics is another great advantage. However, the microstrip wavetrapping effects inhibit the radiation mechanism and must be taken into account in antenna design. Wave-trapping effects in substrates involve the study of surface waves and discontinuities in open waveguide structures. The microstrip antenna designer must therefore encompass many more effects than previously considered by microstrip circuit designers. It is for these reasons that the scope of this monograph is necessarily somewhat wider than the title may suggest. The ten chapters are a blend of introductory, practical and theoretical treatments and likely future developments are also highlighted. A good selection of past and current references are given and each chapter concludes with a helpful summary comment.

This comprehensive resource presents antenna fundamentals balanced with the design of printed antennas. Over 70 antenna projects, along with design dimensions, design flows and antenna performance results are discussed, including antennas for wireless communication, 5G antennas and beamforming. Examples of smartphone antennas, MIMO antennas, aerospace and satellite remote sensing array antennas, automotive antennas and radar systems and many more printed antennas for various applications are also included. These projects include design dimensions and parameters that incorporate the various techniques used by industries and academia. This book is intended to serve as a practical microstrip and printed antenna design guide to cover various real-world applications. All Antenna projects discussed in this book are designed, analyzed and simulated using full-wave electromagnetic solvers. Based on several years of the author's research in antenna design and development for RF and microwave applications, this book offers an in-depth coverage of practical printed antenna design methodology for modern applications.

Analysis of Microstrip Antennas Using Moment Methods

Antenna Theory and Microstrip Antennas

Planar Antennas

New Trends, Techniques and Applications

Microstrip AntennasThe Analysis and Design of Microstrip Antennas and ArraysJohn Wiley & Sons

Offering extensive coverage of microstrip antennas, from rectangular and circular to broadband and dual-band, this text gives a complete introduction to useful designs and the implementation aspects of these types of antennas.

Microstrip patch antennas are becoming increasingly useful because they can be printed directly onto a circuit board. Microstrip antennas are becoming very widespread within the mobile phone market. Patch antennas are low cost, have a low profile and are easily fabricated.The aim of this book is to clarify the design and Analysis process of a rectangular Microstrip Patch Antenna and study the effect of antenna dimensions Length (L), Width (W) and substrate parameters relative Dielectric constant, substrate thickness (t) on the Radiation parameters of Bandwidth and Beam-width.

Analysis and Design

Microstrip Antenna

The Analysis of Microstrip Wire-grid Antenna Arrays

Design and Analysis of a Rectangular Microstrip Patch Antenna

A new feed configuration for microstrip antennas is analyzed. The antenna consists of a single rectangular microstrip patch coupled through a rectanular aperture to a microstrip line on a separate substrate. The report describes the theory which uses a moment method analysis to calculate the antenna's input impedance. The analysis was verified by comparison with measurements of patch antennas on a low-dielectric-constant substrate (2.54) and the Feed line on high-dielectric-constant (10.2) substrate. (Author).

A guide to broadband microstrip antennas, offering information to help you choose and design the optimum broadband microstrip antenna configurations for your applications, without sacrificing other antenna parameters. The text shows you how to take advantage of the light-weight, low volume benefits of these antennas, by providing explanations of the various configurations and simple design equations that help you analyze and design microstrip antennas with speed and confidence. This practical resource presents an understanding of the radiation mechanism and characteristics of microstrip antennas, and provides guidance on designing new types of planar monopole antennas with multi-octave bandwidth. The authors explore how to select and design proper broadband microstrip antenna configurations for compact, tunable, dual-band and circular polarization applications. Moreover, the work compares all the broadband techniques and suggests the most attractive configuration.

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 Fourier 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.

Analysis of Rectangular Microstrip Antennas

Feed Analysis for Microstrip Antennas

Analysis and Modeling of Microstrip Antennas with Electromagnetically Coupled Feeds

Theory and Design

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 book focuses on recent advances in the field of microstrip antenna design and its applications in various fields including space communication, mobile communication, wireless communication, medical implants and wearable applications. Scholars as well as researchers and those in the electronics/ electrical/ instrumentation engineering fields will benefit from this book. The book shall provides the necessary literature and techniques using which to assist students and researchers would design antennas for the above- mentioned applications and will ultimately enable users to take measurements in different environments. It is intended to help scholars and researchers in their studies, by enhancing their the knowledge and skills in on the latest applications of microstrip antennas in the world of communications such as world like IoT, D2D, satellites and wearable devices, to name a few. FEATURES Addresses the complete functional framework workflow in printed antenna design systems Explores the basic and high-level concepts, including advanced aspects in planer design issues, thus serving as a manual for those in the the industry while also assisting beginners Provides the latest techniques used for antennas in terms of structure, defected ground, MIMO and fractal designs Discusses case studies related to data-intensive technologies in microchip antennas in terms of the most recent applications and similar uses for the Internet of Things and device-to-device communication

Based on Bahl and Bhartia's popular 1980 classic, Microstrip Antennas, this all new book provides the detail antenna engineers and designers need to design any type of microstrip antenna. After addressing essential microchip antenna theory, the authors highlight current design and engineering practices, emphasizing the most pressing issues in this area, including broadbanding, circular polarization, and active microstrip antennas in particular. Special design challenges, ranging from dual polarization, high bandwidth, and surface wave mitigation, to choosing the proper substrate, and shaping an antenna to achieve desired results are all covered.

Microstrip and Printed Antennas

Microstrip and Printed Antennas: Applications-Based Designs

Analysis and Design of U Slot Microstrip Antennas

Broadband Microstrip Antennas

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

Bendable wearable materials like conductive strands, fluid metallic mixes, and polymer in paper are generally utilized as a part of the current adaptable electronic gadgets. Extra necessities are implemented in wearable applications. Characteristic elastic, for example, is an appealing exchange adaptable material that is biocompatible and offers high conductivity, low lost, simplicity to make, and most importantly, it is water/climate safe and condition amicable. The wearable antenna is one of the key components to establish body area network (BAN) for wireless communication, which is why it has become such an important part of antenna research. Wearable antennas are being applied successfully in various parts of life such as health monitoring, physical training, navigation, RFID, medicine, military, and more. Emerging Materials and Advanced Designs for Wearable Antennas explores how wearable antenna technology is being employed to enhance the quality of life in various industries. The technologies implemented and success of these antenna technologies is essential in the emerging field of wearable computing and is discussed in detail within the contents of this book. While covering essential topics such as the optimization of antenna material, improvement in flexible antenna performance, synthesis and design aspects of antennas, and transmission and receiving of the bendable antenna, this book is ideal for the military field, scientists, the medical field, practitioners, stakeholders, researchers, academicians, and students looking for the most advanced and updated research on the technology and implementation of wearable antennas spanning multiple industries.

A rectangular microstrip patch which is excited by an electromagnetically coupled microstripline is analyzed and modeled. Moment method analysis is employed to obtain approximate representations for the patch and feedline current distributions, and input impedances are found by examining the current standing wave pattern along a portion of the feedline where the fields are quasi-transverse electromagnetic (quasi-TEM). Through this procedure, the computed input impedances are uniquely and meaningfully defined and are essentially independent of the properties of any connector or transition which may be utilized to excite the feedline. Thus, it is unnecessary to theoretically account for the presence of such connectors or transitions when performing input impedance calculations. In the analytical model, a fictitious excitation device which is simple to evaluate in the numerical analysis is used in lieu of a connector to launch an incident wave along the microstripline. The formulation of the theoretical analysis is accomplished through the use of a plane wave spectrum representation of the Green's function for a grounded dielectric slab. An integral equation for the unknown patch and feedline electric current distributions is obtained by enforcing boundary conditions on both the patch and feedline, and Galerkin's method is applied to obtain the desired moment matrix equation. A method of improving the convergence of the resulting spectral integrals is described and illustrated. An experimental method of characterizing a coax-to-microstrip transition is described. The transition, which is used to connect the actual antenna and feedline to a source or network analyzer, is modeled as a reciprocal, two-port device using an S-parameter matrix representation. This S-parameter description provides a simple means of relating measured and computed values of input impedance. The accuracy of the impedance computations and the utility of the experimental characterization of the transition are demonstrated through comparison of theoretical and experimental data. Excellent agreement between calculated and measured results is obtained.

Design and Applications

Analysis and Design of Wideband Microstrip Antennas for Mobile Communications

CAD of Microstrip Antennas for Wireless Applications

Design of Nonplanar Microstrip Antennas and Transmission Lines

This comprehensive reference text discusses fundamental concepts, applications, design techniques, and challenges in the field of planar antennas. The text focuses on recent advances in the field of planar antenna design and their applications in various fields of research, including space communication, mobile communication, wireless communication, and wearable applications. This resource presents planar antenna design concepts, methods, and techniques to enhance the performance parameters and applications for IoTs and device-to-device communication. The latest techniques used in antenna design, including their structures defected ground, MIMO, and fractal design, are discussed comprehensively. The text will be useful for senior undergraduate students, graduate students, and academic researchers in fields including electrical engineering, electronics, and communication engineering.

Volume II of Theoretical Studies of Microstrip Antennas deals with the analysis and synthesis of several types of novel multi-resonant elements with emphasis on dual-frequency operation of rectangular microstrip patch antennas with or without external matching networks. Specifically, we analyze dual resonances created within a single rectangular patch by means of appropriate dielectric loading and also those associated with a patch capacitively-coupled to either a lumped or distributed matching network. In all cases radiation is obtained from slots in the rectangular patch in combination with open-circuited edges. Rather than separately design the dual-resonating elements and matching networks and hope for efficient radiation and proper patterns at both frequencies, we favor and herein pursue an integrated synthesis which demands simultaneous fulfillment of the design goals. A synthesis approach, based upon coupled resonator theory, is also developed and applied to situations in which one resonant element is a rectangular mircostrip patch and the second element either a second patch or else a lumped or distributed matching network. Based upon these considerations, several new antenna configurations are proposed that utilize either in line or stacked element geometries. Volume I of this report deals with general design techniques and analyses of single and coupled microstrip radiating elements. (Author).

The book reviews developments in the following fields:circular microstrip antennas; microstrip patch antennas; circular polarisation and bandwidth; microstrip dipoles; multilayer and parasitic configurations; wideband flat dipole and short-circuit microstrip patch elements and arrays; numerical analysis; multiport network approach; transmission-line model; rectangular microstrip antennas; low-cost printed antennas; printed phased-array antennas; circularly polarised antenna arrays; microstrip antenna feeds; substrate technology; computer-aided design of microstrip and triplate circuits; resonant microstrip antenna elements and arrays for aerospace applications; mobile and satellite systems; conical conformal microstrip tracking antenna; and microstrip field diagnostics.

Emerging Materials and Advanced Designs for Wearable Antennas

Antenna Theory

Microstrip Antenna Design Handbook

The Analysis and Design of Microstrip Antennas and Arrays

Small planar antennas are becoming increasingly popular in personal wireless communication systems since these antennas offer advantages such as small size, light weight, robust construction, ease of integration into mobile handsets, reasonable radiation efficiency and gain. A new small microstrip antenna operating at 880MHz is designed using the Finite difference time domain technique incorporating the perfectly matched-layer formulation. Shorting pins are used to achieve the reduction in size. The size of this patch antenna is approximately four times less than that of the regular half wavelength patch antenna. An antenna array made of the new patch antennas is used ina multiple antenna system to reliably separate different users on the same channel using linearbeam steering techniques with the ultimate goal of increasing the channel capacity. Prototypes of the proposed dual shorted-pin-patch antenna are fabricated and measurements of their return loss compare well with the computational results.

Antenna Theory and Microstrip Antennas offers a uniquely balanced analysis of antenna fundamentals and microstrip antennas. Concise and readable, it provides theoretical background, application materials, and details of recent progress. Exploring several effective design approaches, this book covers a wide scope, making it an ideal hands-on resource for professionals seeking a refresher in the fundamentals. It also provides the basic grounding in antenna essentials that is required for those new to the field. The book's primary focus is on introducing practical techniques that will enable users to make optimal use of powerful commercial software packages and computational electromagnetics used in full wave analysis and antenna design. Going beyond particular numerical computations to teach broader concepts, the author systematically presents the all-important spectral domain approach to analyzing microstrip structures including antennas. In addition to a discussion of near-field measurement and the high-frequency method, this book also covers: Elementary linear sources, including Huygen's planar element, and analysis and synthesis of the discrete and continuous arrays formed by these elementary sources The digital beam-forming antenna and smart antenna Cavity mode theory and related issues, including the design of irregularly shaped patches and the analysis of mutual coupling Based on much of the author's own internationally published research, and honed by his years of teaching experience, this text is designed to bring students, engineers, and technicians up to speed as efficiently as possible. This text purposefully emphasizes principles and includes carefully selected sample problems to ease the process of understanding the often intimidating area of antenna technology. Paying close attention to this text, you will be able to confidently emulate the author's own systematic approach to make the most of commercial software and find the creative solutions that every job seems to require.

A one-stop reference to the design and analysis of nonplanarmicrostrip structures. Owing to their conformal capability, nonplanar microstripantennas and transmission lines have been intensely investigatedover the past decade. Yet most of the accumulated research has beentoo scattered across the literature to be useful to scientists andengineers working on these curved structures. Now, antenna expert Kin-Lu Wong compiles and organizes thelatest research results and other cutting-edge developments into anextensive survey of the characteristics of microstrip antennasmounted on canonical nonplanar surfaces. Demonstrating a variety oftheoretical techniques and deducing the general characteristics ofnonplanar microstrip antennas from calculated results, Wongthoroughly addresses the problems of cylindrical, spherical, andconical structures and gives readers powerful design andoptimization tools. Up-to-date topics range from specific applications of sphericaland conical microstrip arrays to the curvature effects on theanalysis of cylindrical microstrip lines and coplanar waveguides.With 256 illustrations and an exhaustive list of references,Design of Nonplanar Microstrip Antennas and TransmissionLines is an indispensable guide for antenna designers inwireless and personal communications and in radar systems, and aninvaluable reference for researchers and students interested inthis important technology.

Modelling, Simulation and Analysis of a Single Rectangular Microstrip Patch Antenna Characteristic

Analysis and Design of Microstrip Antenna for a Smart-antenna Test-bed

Analysis and Synthesis of Microstrip Antennas Including Mutual Coupling

This research investigated the microstrip patch antennas performance by studying and analyzing its characteristics and parameters that makes the microstrip elements resonates and radiates microwave signals into space. the literature, research, analysis and experiments through simulation is done qualitatively, if not quantitatively, to the characteristics of a square or rectangle microstrip antennas.

An array antenna is an assembly of radiating elements in one of many possible geometrical configurations with outputs of the individual elements in the array combined to produce radiation of desired pattern shape and gain. The advantages of array antennas over a single antenna include the following: 1) high gain and high resolution without increasing the physical size of each element, 2) electronic control of radiation patterns, such as scanning of main beam and shaping of radiation pattern, and 3) graceful degradation. Many techniques have been developed in the synthesis of array patterns. Most of the techniques, however, ignore mutual coupling between array elements. Mutual coupling is the electromagnetic interaction between array elements. In addition, unless the antenna elements are perfectly isolation power dividers are used, there will be coupling through the feed network. The two fold coupling problem (element-to-element and feed network coupling) then becomes difficult for analysis and very difficult for synthesis. This is because coupling from one element to another can travel through the feed network and reappear in other elements leading to further antenna coupling: this is an endless coupling effect. (RH).

Microstrip Patch Antennas (Second Edition)

Theoretical Studies of Microstrip Antennas. Volume I. General Design Techniques and Analyses of Single and Coupled Elements

Microstrip Antennas

Analysis and Design of Via Loaded Microstrip Antennas