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A Study of Techniques to Solve the Disparate Mesh Size Problem with an Application to Sinuous Antennas Dual Polarized Sinous Antenna and Ultra Wideband Feed Design and Integration Finite Element Analysis of Antennas and Arrays *The Broadband, Shallow, Reflecting Cavity-backed Slot Spiral Antenna* **Frequency Independent Antennas** *Helical and Spiral Antennas IRC-SET 2021 Four-arm Spiral Antennas POLYGONAL SPIRAL ANTENNAS. Phase Distributions of Spiral Antennas* **Ambient and Cryogenic, Decade Bandwidth Low Noise Receiving System for Radio Astronomy Using Sinuous Antenna** Gain Measurement of a Cavity-backed Spiral Antenna from 4 to 18GHz Using the Three-antenna Method **A New Planar Feed for Slot Spiral Antennas** Proposals and Measurements on a Reflector Backed Equiangular Spiral Antenna **Analysis and Design of a Multifunctional Spiral Antenna Practical ESM Analysis An Archimedean Spiral Antenna with**

Dielectric Loading Providing Directional Radiation Patterns Using a Novel Shape 3D Printed Ground Structure Radiation and Polarization Diversities of Compact Archimedean Spiral Antennas Ultra-wideband RF System Engineering Modern Small Antennas Experimental and Theoretical Study of Wide-band Spiral Antenna Miniaturization Via Material and Lumped Element Loadings The Spiral Antenna **An Investigation of the Radiation and Impedance Characteristics of a Spiral Antenna** Ultra Wide Band Antennas Concepts and Applications of MICROWAVE ENGINEERING *Phased Arrays for Radio Astronomy, Remote Sensing, and Satellite Communications* Circularly Polarized Antennas **Wideband, Multiband, and Smart Antenna Systems** *A Broadband VHF-L Band Cavity-Backed Slot Spiral Antenna* Air Force Magazine **Circularly Polarized Antenna Technology WAVE PROPAGATION AND ANTENNA ENGINEERING** *Microstrip and Printed Antennas: Applications-Based Designs* **Modern Antenna Design** Compact Antennas for Wireless Communications and Terminals **Antenna Engineering Handbook, Fourth Edition** An Investigation of the Near Fields on the Conical Equiangular Spiral Antenna *Polarization Properties of Plane Equiangular Spiral Antennas* **Cascaded Conical Spiral Antenna for General Polarization** Multi-functional Slot Spiral-based Antennas for Airborne and Automotive Applications

Ultra Wide Band Technology (UWB) has reached a level of maturity that allows us to offer wireless links with either high or low data rates. These wireless links are frequently associated with a location capability for which ultimate accuracy varies with the inverse of the frequency bandwidth. Using time or frequency domain waveforms, they are currently the subject of international standards facilitating their commercial implementation. Drawing up a complete state of the art, Ultra Wide Band Antennas is aimed at students, engineers and researchers and presents a summary of internationally recognized studies. This book highlights contemporary state of research in multidisciplinary areas in computer science, computer engineering, chemical engineering, mechanical engineering, physics, biomedical sciences, life sciences, medicine, and health care. The accepted submissions to the 7th IRC Conference on Science, Engineering and Technology (IRC-SET 2021) that were presented on August 7, 2021, are published in this conference proceedings. The papers presented here were shortlisted after extensive rounds of rigorous reviews by a panel of esteemed individuals who are pioneers and experts in their respective domains. The “bible of antenna engineering” fully updated to provide state-of-the-art coverage in antenna design and applications Edited by John L. Volakis, one of the world's leading authorities in antenna engineering, this trusted resource covers all the classic antenna types plus many new types and designs used in communications systems, satellites, radars, and emerging applications from WLAN to automotive systems to

biomedical to smart antennas. You will also find expert discussion of topics critical to successful antenna design and engineering, such as measurement techniques and computational methods, a materials guide, wave propagation basics, microwave circuits, and matching techniques, as well as diversity and MIMO propagation models, frequency selective surfaces, and metamaterials. Packed with 1,500 illustrations, the 4th Edition of Antenna Engineering Handbook presents: Step-by-step guidance on most antennas (modern and classic) 59 chapters with 21 new chapters and 38 fully updated chapters from the previous edition Contributions from over 80 well-known antenna experts Full-color insert illustrating many commercial and military antennas Get Quick Access to All of Today's Cutting-Edge Antennas • Printed and Conformal Antennas • Wideband Patch Antennas • Wideband Arrays • Leaky-Wave Antennas • EBG Antennas • UWB Antennas and Arrays • Portable TV Antennas • Reconfigurable Antennas • Active Antennas • Millimeter Wave and TeraHertz Antennas • Fractal Antennas • Handset and Terminal Antennas • Biomedical Antennas • ECM and ESM antennas • Dielectric Resonator Antennas • Lens Antennas • Radiometer Antennas • Satellite Antennas • Reflector and Earth Station Antennas • and Dozens More! Slot spiral antennas offer the possibility for very thin and conformal designs. This report covers the physical characteristic of a cavity-backed slot spiral, as well as the associated infinite balun and termination designs. The report traces through the development and characteristics of a 6 inch and 18 inch version of the slot spiral. Simulations and

measurements of various cavity-backed spirals are presented and used to optimize the antenna's computations. Several options for miniaturizing this design using capacitive and inductive loadings are also presented. This book provides current R&D trends and novel approaches in design and analysis of broadband, multiband, and smart antennas for 5G and B5G mobile and wireless applications, as well as the identification of integration techniques of these antennas in a diverse range of devices. The book presents theoretical and experimental approaches to help the reader in understanding the unique design issues and more advanced research. Moreover, the book includes chapters on the fundamentals of antenna theory. The book is pertinent to professionals and researchers working in the field of antenna engineering; it is written for graduate students, researchers, academics, and industry practitioners who want to improve their understanding in the current research trends in design analysis of broadband, multiband, and smart antennas for wireless applications. The current distribution has been measured on a conical equiangular spiral antenna. A correlation between the operation of the conical logspiral antenna and the operation of the uniform circular bifilar helix is established by utilizing a general theory of backward wave radiation from periodic structures. Operation beyond the normal frequency limits has been explored and discussed. The arms of the antenna were constant diameter conductors. The effects of this deviation from the ideal design, which calls for a linearly increasing diameter, have been observed. The far field measurements, giving for example the center of

phase location, agrees with the near field probing. (Author). The book presents basic and advanced concepts of circularly polarized antennas, including design procedure and recent applications. Cross dipole antennas, microstrip antennas, helical antennas, quadrifilar helix antennas, frequency independent antennas, horn antennas, omnidirectional circularly polarized antennas and radial line arry antennas are discussed. With abundant examples, the book is an essential reference for researchers and engineers. The book is primarily designed to cater to the needs of undergraduate and postgraduate students of Electronics and Communication Engineering and allied branches. The book has been written keeping average students in mind. This well-organised and lucidly written text gives a comprehensive view of microwave concepts covering its vast spectrum, transmission line, network analysis, microwave tubes, microwave solid-state devices, microwave measurement techniques, microwave antenna theories, radars and satellite communication. KEY FEATURES • A fairly large number of well-labelled diagrams provides practical understanding of the concepts. • Solved numerical problems aptly crafted and placed right after conceptual discussion provide better comprehension of the subject matter. • Chapter summary highlights important points for quick recap and revision before examination. • About 200 MCQs with answers help students to prepare for competitive examinations. • Appropriate number of unsolved numerical problems with answers improves problem solving skill of students. • Simplified complex mathematical derivations by

synthesising them in smaller parts for easy grasping. Audience Undergraduate and Postgraduate students of Electronics and Communication Engineering and allied branches The Most Complete, Up-to-Date Coverage of the Finite Element Analysis and Modeling of Antennas and Arrays Aimed at researchers as well as practical engineers—and packed with over 200 illustrations including twenty-two color plates—Finite Element Analysis of Antennas and Arrays presents: Time- and frequency-domain formulations and mesh truncation techniques Antenna source modeling and parameter calculation Modeling of complex materials and fine geometrical details Analysis and modeling of narrowband and broadband antennas Analysis and modeling of infinite and finite phased-array antennas Analysis and modeling of antenna and platform interactions Recognizing the strengths of other numerical methods, this book goes beyond the finite element method and covers hybrid techniques that combine the finite element method with the finite difference time-domain method, the method of moments, and the high-frequency asymptotic methods to efficiently deal with a variety of complex antenna problems. Complemented with numerous examples, this cutting-edge resource fully demonstrates the power and capabilities of the finite element analysis and its many practical applications. Compact Antennas for Wireless Communications and Terminalsdeals with compact microwave antennas and, more specifically, withthe planar version of these antennas. Planar antennas are the mostappropriate type of antenna in modern communication systems andmore generally in all

applications requiring miniaturization,integration and conformation such as in mobile phonehandsets. The book is suitable for students, engineers and scientists eagerto understand the principles of planar and small antennas, theirdesign and fabrication issues, and modern aspects such as UWBantennas, reconfigurable antennas and diversity issues. The book is primarily designed to cater to the needs of undergraduate and postgraduate students of Electronics and Communication Engineering and allied branches. It also caters for fundamental requirements of professionals working on design and development of antenna and wave propagation related equipment either in research laboratories or industries or academic institutions elsewhere. The book has been written with intent to grasp the basic understanding of theoretical as well as practical aspects of electromagnetic wave propagation and antenna engineering. The text has been aptly scripted considering the requirements of average students who can easily grasp and comprehend the basics of wave propagation and radiation mechanism of varieties of antennas coupled with their critical functionalities, utilities, advantages/disadvantages without any external assistance of teachers or other reference books. The book broaches very well on practical methods of parametric measurements of antenna with right measuring test equipment and associated tools. The last chapter of the book is dedicated to advance technology adopted in design and development of modern antenna. Key features • A fairly large number of well labelled diagrams to provide practical understanding of the concepts. • The placement of numericals at appropriate

places develops confidence among readers and enthuses them further to read in depth to crack any regular or competitive examinations. • Chapter summary highlights important points for quick recap and revision before examination. • Well-crafted multiple choice questions with answers at the end of each chapter to stimulate thought process and prepare better for viva-voce and competitive examinations. • Appropriate number of unsolved numerical problems with answers to improve problem solving skill of students. A spiral antenna is a radiation element that radiates a circularly polarized wave over a wide frequency bandwidth. It is commonly used in receiving application, where wideband antennas and circular polarization are needed, such as onboard a military platform. To avoid environmental hazards that may deteriorate an externally mounted antenna, this investigation evaluates the design and performance of an Archimedean spiral antenna intended for seamless integration into the armor of an existing platform. The effect of loading different materials on top of the radiating surface of the antenna and the effect of applying different conducting ground structures of various geometric configurations to the back of the antenna are modeled, determining the optimum performance for use in this application. The superstrate loading is necessary to protect the structure of the antenna and also to achieve miniaturization of the spiral antenna. Lack of a ground plane with a spiral antenna necessitates the use of a conducting grounding structure to minimize the back lobe and increase the gain of the spiral antenna on the main lobe. This study

identifies an antenna design, superstrate material, and a 3D ground structure combination acceptable for potential military application. The significance of light weight design for communication has increased tremendously, and hence weight reduction of antennas is a major consideration for seamless integration to existing systems. A novel 3D printed ground structure is designed to enhance the Right-Hand Circular Polarization (RHCP) gains and minimize the undesired radiation in the lower hemisphere of the spiral antenna without the loss of the antenna's broadband characteristics. Due to the high resolution and accuracy of the 3D printer, the printed design is able to achieve 90% weight reduction in comparison to the traditional Computerized Numerical Control (CNC) machining method. The design and prototyping of a spiral antenna that can seamlessly integrate with current military platforms and Defense communication systems conducted under this research is a success. Based on simulated and measured results, the protective dielectric material loaded spiral antenna, backed by a conducting ground structure, is verified and validated as a capable antenna for use with this unique application. This book presents a comprehensive insight into the design techniques for different types of CP antenna elements and arrays In this book, the authors address a broad range of topics on circularly polarized (CP) antennas. Firstly, it introduces to the reader basic principles, design techniques and characteristics of various types of CP antennas, such as CP patch antennas, CP helix antennas, quadrifilar helix antennas (QHA), printed quadrifilar helix antennas (PQHA),

spiral antenna, CP slot antennas, CP dielectric resonator antennas, loop antennas, crossed dipoles, monopoles and CP horns. Advanced designs such as small-size CP antennas, broadband, wideband and ultra-wideband CP antennas are also discussed, as well as multi-band CP antennas and dual CP antennas. The design and analysis of different types of CP array antennas such as broadband CP patch arrays, dual-band CP arrays, CP printed slot arrays, single-band and multi-band CP reflectarrays, high-gain CP waveguide slot antennas, CP dielectric resonator antenna arrays, CP active arrays, millimetre-waveband CP arrays in LTCC, and CP arrays with electronically beam-switching or beam-steering capabilities are described in detail. Case studies are provided to illustrate the design and implementation of CP antennas in practical scenarios such as dual-band Global Navigation Satellite Systems (GNSS) receivers, satellite communication mobile terminals at the S-band, Radio Frequency Identification (RFID) readers at 2.4 GHz, and Ka-band high-speed satellite communication applications. It also includes the detailed designs for a wideband Logarithmic spiral antenna that can operate from 3.4-7.7 GHz. In addition, the book offers a detailed review of the recent developments of different types of CP antennas and arrays. Presents comprehensive discussions of design techniques for different types of CP antennas: small-size CP antennas, broadband CP antennas, multi-band CP antennas and CP arrays. Covers a wide range of antenna technologies such as microstrip antennas, helix, quadrifilar helix antenna, printed quadrifilar helix antenna, dielectric resonator antennas, printed slots,

spiral antennas, monopoles, waveguide slot arrays, reflectarrays, active arrays, millimetre-wave arrays in LTCC, electronically beam-switching arrays and electronically beam-steerable arrays. Reviews recent developments in different types of CP antennas and arrays, reported by industries, researchers and academics worldwide. Includes numerous case studies to demonstrate how to design and implement different CP antennas in practical scenarios. Provides both an introduction for students in the field and an in-depth reference for antenna/RF engineers who work on the development of CP antennas. Circularly Polarized Antennas will be an invaluable guide for researchers in R&D organizations; system engineers (antenna, telecom, space and satellite); postgraduates studying the subjects of antenna and propagation, electromagnetics, RF/microwave/millimetre-wave systems, satellite communications and so on; technical managers and professionals in the areas of antennas and propagation. Written by a prominent expert in the field, this authoritative resource considers radar parameters and how they affect ESM systems. It describes the ESM environment, including types of radar, pulse density, the latest radar developments and how they will be seen by ESM systems. Different types of ESM systems are described, with methods of calculation of Direction of Arrival (DOA) of pulses. Conventional wisdom about RF scan strategies for narrow-band receivers will be challenged and new methods (proven to be effective in trials) will be proposed. The book describes ESM Antenna separation, which plays a significant part in the generation of DOA errors, with examples of the effects

for different situations. The book will explain the common phenomena seen in ESM systems with many examples of how to recognize issues in the ESM data and solutions for their mitigation. Techniques for visualizing ESM data and how to set up ESM trials will be given, including the simulation of the electromagnetic environment. The book also presents detailed calculations for generating emitter beam-shapes for use in simulations of pulse trains and the calculation of detection range will be useful for data analysts, trials engineers and system assessors, which are not published elsewhere. The identification of radars by ESM systems is considered in detail with ideas presented on how to generate an effective radar library. Discover a modern approach to the analysis, modeling and design of high sensitivity phased arrays. Network theory, numerical methods and computational electromagnetic simulation techniques are uniquely combined to enable full system analysis and design optimization. Beamforming and array signal processing theory are integrated into the treatment from the start. Digital signal processing methods such as polyphase filtering and RFI mitigation are described, along with technologies for real-time hardware implementation. Key concepts from interferometric imaging used in radio telescopes are also considered. A basic development of theory and modeling techniques is accompanied by problem sets that guide readers in developing modeling codes that retain the simplicity of the classical array factor method while incorporating mutual coupling effects and interactions between elements. Combining current research trends with

pedagogical material suitable for a first-year graduate course, this is an invaluable resource for students, teachers, researchers, and practicing RF/microwave and antenna design engineers. A practical book written for engineers who design and useantennas The author has many years of hands on experience designingantennas that were used in such applications as the Venus and Marsmissions of NASA The book covers all important topics of modern antenna designfor communications Numerical methods will be included but only as much as areneeded for practical applications This report presents the results of the measurement of the maximum gain of a cavity-backed spiral antenna in the frequency range of 4-18 GHz. This measurement activity was requested by CFEWC. The method selected for this measurement was the three-antenna method for antenna gain measurements. As the antenna-under-test (AUT) is a circularly polarized (CP) antenna, the method was extended to obtain the CP co-pol and cross-pol gain of the AUT. This method requires the use of two other linearly polarized (LP) antennas. Two sets of gain measurements were performed using the LP antennas with their polarization oriented horizontally and then vertically. The two antennas were TECOM LP quad-ridged horns. Although these horns are dual polarized, only one polarization was used. This report describes also the three-antenna method algorithm, the Matlab program written for this application, and gives an outlook of the experimental steps and procedures required to implement the method. The antenna gain measurements were made in the far-field antenna measurement range in the

DREO-DFL Antenna Research Laboratory (DDARLing). Frequency Independent Antennas provides a reasonably complete coverage of frequency independent antennas from its inception until the middle of 1965. Most of the contents have not previously been published, except in scattered journal articles, and some are original. The first six chapters are written at a fairly easy level—about the level of a beginning graduate student or the more advanced undergraduate. The last two chapters, which deal with solutions of Maxwell's equations, are at a somewhat higher level. The book opens with a discussion of some fundamental ideas about antennas. It shows how typical measurements can be understood in terms of classical electromagnetic theory: in other words, how to make sense of measured data, how to set up apparatus to get meaningful data, and how to test their significance. Separate chapters follow on the features of frequency independent, plane-sheet, spiral, and log-periodic antennas. Subsequent chapters discuss how the periodic structure theory provides a way of understanding the peculiarities of frequency independent antennas; and solutions of Maxwell's equations for idealized spiral and idealized sinusoidal structures. Literature on the problem of frequency independent antennas is reviewed. The main idea suggested was the relaxation of the similarity condition on the rigorous angular structures. The construction of polygonal spiral antennas is given in terms of the construction of the polygonal spiral curve. Through the construction the relation between the structure with the continuous similarity condition and that with discrete

similarity condition is demonstrated. Experimental methods were used in determining the applicability of the polygonal spiral structure for the use of the frequency independent antenna. Measurement results showed that the rectangular spiral antenna is a good approximation to the log-spiral antenna, for two equivalent antennas of these types behave practically the same, as far as the frequency independent operation is concerned. Measurements were also made of a bifilar log-periodic zigzag antenna, a special case of the polygonal spiral antenna. (Author). Abstract: Spiral antennas are of great interest for many broadband applications because of their inherent large bandwidth. This dissertation explores novel techniques for reducing size of conformal antennas with particular emphasis on spirals. Specifically, a new scheme based on distributed reactive loads is developed for concurrent control of the spiral impedance and wave velocity, without increasing the antenna volume. We also show that a properly terminated spiral element with material and absorber loading can achieve 0 dBi realized gain even when its size is only 0.15 wavelength per side and 0.05 wavelength in height at the lowest operational frequency (with ground plane backing), which is 3 times smaller than previous publications. The proposed size reduction techniques were adapted to develop a ground plane-backed six-element L-band spiral array delivering circular polarization. This L-band aperture is 1.9 times smaller than earlier versions and approached optimal size miniaturization. An extension of Chu's antenna limit theory is also presented subject to a given impedance mismatch factor. This

extension provided, for the first time, a relation between antenna size and maximum achievable realized gain for a source with real impedance. Our examination of spiral miniaturization further indicated that the concept of wave slow-down is both an enabling and a limiting factor. This report presents a new planar, wideband feed network for a slot spiral antenna, and the subsequent design and performance of a VHF antenna utilizing this feed design. Both input impedance and radiation pattern measurements are presented to demonstrate the performance and usefulness of this feed. Almost all previous designs have utilized wire spirals, requiring bulky, non-planar feeds with separate baluns, and large absorbing cavities. The presented slot spiral antenna feed integrates the balun into the structure of the slot spiral antenna, making the antenna and feed planar. This greatly simplifies the design and construction of the antenna, in addition to providing repeatable accuracy. It also allows the use of a very shallow reflecting cavity for conformal applications. Finally, this feeding approach now makes many of the known miniaturization techniques viable options. Nurnberger, M. W. and Volakis, J. L. Unspecified Center NASA-CR-199408, NAS 1.26:199408, MU-030601-6-T NAG1-1478... This monograph, the result of five years of research, presents a fully descriptive account of antennas and scatterers for a circularly polarized wave. The author presents the radiation characteristics of these antennas and scatterers with emphasis on their engineering aspects. Numerical examples treating a system consisting of wires and slots are described and thoroughly analyzed. The first

chapter covers numerical methods and techniques for antenna analysis, followed by chapters describing the square spiral antenna, two-wire round spiral antenna, spiral antenna with two off-center sources, polarization diversity of Archimedian spiral antenna, helical antenna of endfire mode, helical antenna of backfire mode, conical helix antenna, and wire scatterer for a circularly polarized wave. If you are involved in designing and developing small antennas, this complete cutting-edge guide covers everything you need to know. From fundamentals and basic theory to design optimization, evaluation, measurements and simulation techniques, all the essential information is included. You will also get many practical examples from a range of wireless systems, whilst a glossary is provided to bring you up to speed on the latest terminology. A wide variety of small antennas is covered, and design and practice steps are described for each type: electrically small, functionally small, physically constrained small and physically small. Whether you are a professional in industry, a researcher, or a graduate student, this is your essential guide to small antennas. The Archimedean spiral antenna is well-known for its broadband characteristics with circular polarization and has been investigated for several decades. Since their development in the late 1950's, establishing an analytical expression for the characteristics of spiral antenna has remained somewhat elusive. This has been studied qualitatively and evaluated using numerical and experimental techniques with some success, but many of these methods are not convenient in the design process since they do not impart

any physical insight into the effect each design parameter has on the overall operation of the spiral antenna. This work examines the operation of spiral antennas and obtains a closed-form analytical solution by conformal mapping and transmission line model with high precision in a wide frequency band. Based on the analysis of spiral antenna, we propose two novel design processes for the stripline-fed Archimedean spiral antenna. This includes a stripline feed network integrated into one of the spiral arms and a broadband tapered impedance transformer that is conformal to the spiral topology for impedance matching the nominally-high input impedance of the spiral. A Dyson-style balun located at the center facilitates the transition between guided stripline and radiating spiral modes. Measured and simulated results for a probe-fed design operating from 2 GHz to over 20 GHz are in excellent agreements to illustrate the synthesis and performance of a demonstration antenna. The research in this work also provides the possibility to achieve conformal integration and planar structural multi-functionality for an Unmanned Air Vehicle (UAV) with band coverage across HF, UHF, and VHF. The proposed conformal mapping analysis can also be applied on periodic coplanar waveguides for integrated circuit applications. Explains in detail the underlying principles of four-arm spiral direction-finding antennas for those who wish to design such systems. Includes performance results and practical aspects for the first-time designer. For all models, and for symmetrical and simplified variations, discusses mode forming, 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. A comprehensive summary of the state of the art in Ultra Wideband system engineering, from components to system engineering aspects. In this thesis, four-arm Archimedean spiral antennas are investigated, which are low profile and have compact structure. The operating frequency bands can be designed for any microwave and millimeter frequency ranges and the antenna may be utilized in any desired applications such as Global Positioning Systems, radars, navigation systems, modern satellite communications, adaptive nulling, beam shaping, and direction finding. The concept of cavity backed

absorber-filled structure along with a small ground plane embedded inside, as an inexpensive and wideband balun, is employed to reduce the axial size of the antenna. The antenna can generate broadside and boresight-null radiation patterns at the dominant and higher order modes, respectively. The study demonstrates that the proposed compact structure successfully supports the excitation of higher order modes. Polarization diversity of spiral antennas is mathematically described for an N-arm spiral antenna along with the required feeding networks. Realization of circularly-polarized broadside radiation patterns, with both senses of polarization, is then elaborated for a center-fed low-profile four-arm Archimedean spiral antenna. The radiation active zones, for generating both right- and left-handed circular polarization waves, are determined and the antenna performance in a frequency band, shared by both senses of polarization, is investigated. The developed antennas can be utilized in frequency reuse applications to enhance the wireless channel capacity and as primary feeds in high gain reflector antennas. Their performance in small front-fed parabolic reflector antennas is numerically investigated. It is shown that excellent circular polarization performance, with a remarkable radiation pattern symmetry and axial ratios below 0.5dB, low cross polarization components, and reflector total efficiencies, as high as 77.8% can be attained. Moreover, backward radiation properties of center-fed four-arm Archimedean spiral antennas are also explored, and their possible applications in reflector antennas are presented. Finally, the proposed dual-polarized spiral

antennas are further investigated by dielectric loading, for size reduction purposes and frequency tuning applications. Both full and partial dielectric loadings are considered and investigated for the spiral antenna performance. A grooved dielectric substrate is also utilized to enable generating low-contrast dielectric permittivities. The spiral antenna performance, etched on such a grooved substrate, is similarly investigated.

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