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Emerging Waveguide Technology Analysis and Design of Substrate Integrated Waveguide Using Efficient 2D Hybrid Method EPFIL Design and Evaluation of an Electromagnetic Beam Waveguide for Measuring Electrical Properties of Materials Waveguide Components for Antenna Feed Systems A Method for Designing Multi-screw Waveguide Tuners Practical Approach to Substrate Integrated Waveguide (SIW) Diplexer: Emerging Research and Opportunities Fundamentals of Optical Waveguides Beam Propagation Method for Design of Optical Waveguide Devices Slotted Waveguide Array Antennas Beam Propagation Method for Design of Optical Waveguide Devices Design and Fabrication of Planar Optical Waveguide Devices and Materials Design and 3-D Electromagnetic Modeling of Terahertz Waveguide Mixers and Components Advanced Materials for Integrated Optical Waveguides Millimeter-Wave Waveguides Optimization of Waveguide Optics for Lensless X-ray Imaging Introduction to Optical Waveguide Analysis Integrated Optics Arrayed Waveguide Gratings Waveguide-Based Photonic Sensors: From Devices to Robust Systems Arrayed Waveguide Gratings OPTIMAL DESIGN OF WAVEGUIDE FILTER USING ARTIFICIAL INTELLIGENCE TECHNIQUES Waveguide Structuring and Bragg Grating Fabrication by Ultraviolet Light Induced Refractive Index Changes in Photosensitive Optical Materials X-ray waveguide optics Coplanar Waveguide Circuits, Components, and Systems Advanced x-ray multilayer waveguide optics Applications of Grating Waveguide Structures in Solid-State Lasers Design, Manufacturing, and Testing of Planar Optical Waveguide Devices Solid State Laser Superconducting Nanowire Single-Photon Detectors for Quantum Photonic Integrated Circuits on GaAs The Design of Topwall Waveguide Directional Couplers Telecommunication Alternatives with Emphasis on Optical Waveguide Systems Emerging Waveguide Technology Optical Waveguide Sciences Photonic Waveguide Components on Silicon Substrate Integrated Optoelectronics A Design Procedure for Waveguide Microwave Time-delay Filters Planar Waveguide Optical Sensors Microwave Circulator Design Analysis and Design of Substrate Integrated Waveguide Cavity Filter for Microwave & Millimeter Wave Applications

Emerging Waveguide Technology 2018-08-01

recently the rapid development of radiofrequency rf microwave and photonic optical waveguide technologies has had a significant impact on the current electronic industrial medical and information and communication technology ict fields this book is a self contained collection of valuable scholarly papers related to waveguide design modeling and applications this book contains 20 chapters that cover three main subtopics of waveguide technologies namely rf and microwave waveguide photonic and optical waveguide and waveguide analytical solutions hence this book is particularly useful to the academics scientists practicing researchers and postgraduate students whose work relates to the latest waveguide technologies

Analysis and Design of Substrate Integrated Waveguide Using Efficient 2D Hybrid Method 2010-07-07

substrate integrated waveguide siw is a new type of transmission line it implements a waveguide on a piece of printed circuit board by emulating the side walls of the waveguide using two rows of metal posts it inherits the merits both from the microstrip for compact size and easy integration and from the waveguide for low radiation loss and thus opens another door to design efficient microwave circuits and antennas at a low cost this book presents a two dimensional fullwave analysis method to investigate an siw circuit composed of metal and dielectric posts it combines the cylindrical eigenfunction expansion and the method of moments to avoid geometrical discretization of the posts the method is presented step by step with all the necessary formulations provided for a practitioner who wants to implement this method by himself this book covers the siw circuit printed on either homogeneous or inhomogeneous substrate the microstrip to siw transition and the speed up technique for the simulation of symmetrical siw circuits different types of siw circuits are shown and simulated using the proposed method in addition several slot antennas and horn antennas fabricated using the siw technology are also given table of contents introduction siw circuits composed of metallic posts siw circuits with dielectric posts even odd mode analysis of a symmetrical circuit microstrip to siw transition and half mode siw siw antennas

EPFIL 1999

this software package seeks to improve waveguide filter and diplexer design and decrease performance variations without creating overly stringent manufacturing tolerances the accompanying manual helps the reader to cut design time and improve accuracy by quickly and easily predicting performance parameters before building costly prototypes using the mode matching method as a foundation the software supplies a full wave solution for filter discontinuities aiding you in the design of e plane waveguide filters specifically intended for microwave and millimeter wave applications this means you can substantially reduce development and production costs reduce time to market and effectively increase circuit performance

Design and Evaluation of an Electromagnetic Beam Waveguide for Measuring Electrical Properties of Materials 1994

this book delivers an in depth examinations of the three basic field theoretical methods used for the design aid of different waveguide components you ll find cad algorithms examples of their applications and operational principles of various components used in antenna feed systems

Waveguide Components for Antenna Feed Systems 1993

capacitive screw waveguide tuners are commonly used in microwave measurement systems and as devices for adjusting the impedance of various waveguide terminations the design of a broadband tuner of this type has been a problem in the past this paper describes a method for designing tuners which will work effectively for relatively wide ranges of frequencies

A Method for Designing Multi-screw Waveguide Tuners 1970

substrate integrated waveguide siw technology is a twenty first century transmission line that has evolved recently to open new doors to the development of efficient circuits and devices operating in the microwave and millimeter wave frequency range microstrip circuits and devices are inefficient at high frequency applications and require very stringent manufacturing tolerances when used to implement microwave and millimeter wave components this is as a result of the fact that wavelengths are short at higher frequencies waveguide circuits and devices are preferred for higher frequency applications but they are expensive and difficult to manufacture it is also very challenging to integrate a waveguide device with planar devices in its vicinity the siw bridges the gap between the traditional air filled waveguide and planar transmission lines such as microstrip practical approach to substrate integrated waveguide siw diplexer emerging research and opportunities is an essential reference source that discusses the development of efficient circuits and devices operating in the microwave and millimeter wave frequency range through the use of substrate integrated waveguides featuring research on topics such as microstrip resonators circuit model analysis and quality factor extraction this book is ideally designed for researchers engineers scientists developers scholars practitioners educators policymakers and students

Practical Approach to Substrate Integrated Waveguide (SIW) Diplexer: Emerging Research and Opportunities 2020-02-07

fundamentals of optical waveguides is an essential resource for any researcher professional or student involved in optics and communications engineering any reader interested in designing or actively working with optical devices must have a firm grasp of the principles of lightwave propagation katsunari okamoto has presented this difficult

technology clearly and concisely with several illustrations and equations optical theory encompassed in this reference includes coupled mode theory nonlinear optical effects finite element method beam propagation method staircase concatenation method along with several central theorems and formulas since the publication of the well received first edition of this book planar lightwave circuits and photonic crystal fibers have fully matured with this second edition the advances of these fibers along with other improvements on existing optical technologies are completely detailed this comprehensive volume enables readers to fully analyze design and simulate optical atmospheres exceptional new chapter on arrayed waveguide grating awg in depth discussion of photonic crystal fibers pcfs thorough explanation of multimode interference devices mmi full coverage of polarization mode dispersion pmc

Fundamentals of Optical Waveguides 2010-08-04

the basic of the bpm technique in the frequency domain relies on treating the slowly varying envelope of the monochromatic electromagnetic field under paraxial propagation thus allowing efficient numerical computation in terms of speed and allocated memory in addition the bpm based on finite differences is an easy way to implement robust and efficient computer codes this book presents several approaches for treating the light wide angle scalar approach semivectorial treatment and full vectorial treatment of the electromagnetic fields also special topics in bpm cover the simulation of light propagation in anisotropic media non linear materials electro optic materials and media with gain losses and describe how bpm can deal with strong index discontinuities or waveguide gratings by introducing the bidirectional bpm bpm in the time domain is also described and the book includes the powerful technique of finite difference time domain method which fills the gap when the standard bpm is no longer applicable once the description of these numerical techniques have been detailed the last chapter includes examples of passive active and functional integrated photonic devices such as waveguide reflectors demultiplexers polarization converters electro optic modulators lasers or frequency converters the book will help readers to understand several bpm approaches to build their own codes or to properly use the existing commercial software based on these numerical techniques

Beam Propagation Method for Design of Optical Waveguide Devices 2015-12-21

slotted waveguide antenna arrays are used in radar communication and remote sensing systems for high frequencies they have linear polarization with low cross polarization and low losses but can also be designed for dual polarizations and phase steered beams slotted waveguide array antennas is the first comprehensive treatment of these antennas from an engineering perspective it provides readers with a thorough foundation in applicable theories as well as hands on instruction for practical analysis design manufacture and use of important types of waveguide slot arrays it goes beyond some of the commonly discussed topics and ventures into areas that include higher order mode coupling and edge effects performance optimisation in terms of bandwidth and pattern performance and manufacturing tolerances with specific examples of waveguide array designs accompanied by detailed illustrations and antenna characteristics the book is a must have reference for engineers involved in antenna design development and applications iet digital library

Slotted Waveguide Array Antennas 2018

the basic of the bpm technique in the frequency domain relies on treating the slowly varying envelope of the monochromatic electromagnetic field under paraxial propagation thus allowing efficient numerical computation in terms of speed and allocated memory in addition the bpm based on finite differences is an easy way to implement robust and efficient computer codes this book presents several approaches for treating the light wide angle scalar approach semivectorial treatment and full vectorial treatment of the electromagnetic fields also special topics in bpm cover the simulation of light propagation in anisotropic media non linear materials electro optic materials and media with gain losses and describe how bpm can deal with strong index discontinuities or waveguide gratings by introducing the bidirectional bpm bpm in the time domain is also described and the book includes the powerful technique of finite difference time domain method which fills the gap when the standard bpm is no longer applicable once the description of these numerical techniques have been detailed the last chapter includes examples of passive active and functional integrated photonic devices such as waveguide reflectors demultiplexers polarization converters electro optic modulators lasers or frequency converters the book will help readers to understand several bpm approaches to build their own codes or to properly use the existing commercial software based on these numerical techniques

Beam Propagation Method for Design of Optical Waveguide Devices 2015-10-20

this book provides a comprehensive introduction to integrated optical waveguides for information technology and data communications integrated coverage ranges from advanced materials fabrication and characterization techniques to guidelines for design and simulation a concluding chapter offers perspectives on likely future trends and challenges the dramatic scaling down of feature sizes has driven exponential improvements in semiconductor productivity and performance in the past several decades however with the potential of gigascale integration size reduction is approaching a physical limitation due to the negative impact on resistance and inductance of metal interconnects with current copper trace based technology integrated optics provides a potentially lower cost higher performance alternative to electronics in optical communication systems optical interconnects in which light can be generated guided modulated amplified and detected can provide greater bandwidth lower power consumption decreased interconnect delays resistance to electromagnetic interference and reduced crosstalk when integrated into standard electronic circuits integrated waveguide optics represents a truly multidisciplinary field of science and engineering with continued growth requiring new developments in modeling further advances in materials science and innovations in integration platforms in addition the processing and fabrication of these new devices must be optimized in conjunction with the development of accurate and precise characterization and testing methods

students and professionals in materials science and engineering will find advanced materials for integrated optical waveguides to be an invaluable reference for meeting these research and development goals

Design and Fabrication of Planar Optical Waveguide Devices and Materials 2002

millimeter wave waveguides is a monograph devoted to open waveguides for millimeter wave applications in the first chapters general waveguide theory is presented with the emphasis on millimeter wave applications next the book systematically describes the results of both theoretical and experimental studies of rectangular dielectric rod waveguides with high dielectric permittivities simple and accurate methods for propagation constant calculations for isotropic as well as anisotropic dielectric waveguides are described both analytical and numerical approaches are covered different types of transitions have been simulated in order to find optimal configurations as well as optimal dimensions of dielectric waveguides for the frequency band of 75 110 ghz simple and effective design is presented the experimental studies of dielectric waveguides show that sapphire waveguide can be utilized for this frequency band as a very low loss waveguide design of antennas with low return loss based on dielectric waveguides is also described

Design and 3-D Electromagnetic Modeling of Terahertz Waveguide Mixers and Components 2006

lensless x ray imaging is a promising method to determine the three dimensional structure of material science and biological specimens at the nanoscale the development of this technique is strongly related to the optimization of x ray optics since the image formation and object reconstruction depend significantly on the properties of the illumination wave field waveguide optics act as quasi point sources and enable the spatial and coherent filtering of x ray beams up to now x ray waveguides were severely limited in transmission and flux restricting their use to high contrast test structures with moderate resolution and long accumulation times to overcome these limitations a novel waveguide design with an optimized refractive index profile is presented which significantly minimizes the absorption of the modes propagating inside the waveguide experimental results along with simulations show that these two component planar x ray waveguides provide small beam cross sections along with a high photon flux at the exit by a serial arrangement of two waveguide slices an optimized illumination source has been developed for high resolution microscopy as demonstrated in proof of concept imaging experiments

Advanced Materials for Integrated Optical Waveguides 2013-10-17

a complete survey of modern design and analysis techniques for optical waveguides this volume thoroughly details modern and widely accepted methods for designing the optical waveguides used in telecommunications systems it offers a straightforward presentation of the sophisticated techniques used in waveguide analysis and enables a quick grasp of modern numerical methods with easy mathematics the book is intended to guide the reader to a comprehensive understanding of optical waveguide analysis through self study this comprehensive presentation includes an extensive and exhaustive list of mathematical manipulations detailed explanations of common design methods finite element method fem finite difference method fdm beam propagation method bpm and finite difference time domain method fd tdm explanations for numerical solutions of optical waveguide problems with sophisticated techniques used in modern computer aided design cad software solutions to maxwell s equations and the schrodinger equation the authors provide excellent self study material for practitioners researchers and students while also presenting detailed mathematical manipulations that can be easily understood by readers who are unfamiliar with them introduction to optical waveguide analysis presents modern design methods in a comprehensive and easy to understand format

Millimeter-Wave Waveguides 2007-05-08

this work addresses integrated optics from both the theory and practical modelling standpoints describing recent work on beam propagation planar spectrographs four wave coupled mode array cad for integrated optics and component cost modelling

Optimization of Waveguide Optics for Lensless X-ray Imaging 2011

this spotlight provides an overview of the life cycle of arrayed waveguide gratings awgs from design and simulation to evaluation and technological verification the book describes the awg design procedure by applying a new software tool it discusses the appropriateness of different commercially available photonics tools and their advantages and disadvantages to solve the problems posed by evaluation 19 transmission parameters are defined the book demonstrates that there is very good agreement between designed and simulated measured transmission parameters finally the book describes awg designs with excellent optical demultiplexing properties

Introduction to Optical Waveguide Analysis 2004-04-05

integrated photonic sensor systems are miniaturized mass producible devices that leverage the mature semiconductor fabrication technology and a well established ecosystem for photonic circuits this book aims at a holistic treatment of waveguide based photonic sensor systems by analyzing photonic waveguide design photonic circuit design and readout design across all levels a special emphasis is given to system level performance optimization under realistic environmental conditions

Integrated Optics 1995

this spotlight provides an overview of the life cycle of arrayed waveguide gratings awgs from design and simulation to evaluation and technological verification the book describes the awg design procedure by applying a new software tool it discusses the appropriateness of different commercially available photonics tools and their advantages and disadvantages to solve the problems posed by evaluation 19 transmission parameters are defined the book demonstrates that there is very good agreement between designed and simulated measured transmission parameters finally the book describes awg designs with excellent optical demultiplexing properties

Arrayed Waveguide Gratings 2016

in addition fundamental concept of electromagnetic em wave propagation inside waveguide its utility and applications optimal band pass filter bpf design using artificial intelligence ai techniques simulation fabrication and measurement techniques of waveguide based filters are discussed in brief motivation scope of the research work done so far and organization of this thesis has been included in this chapter the research work carried out so far on the chosen topic and a clear picture of the achievements done so far to complete the thesis has been included briefly in this chapter and elaborated in respective chapters of this thesis

Waveguide-Based Photonic Sensors: From Devices to Robust Systems 2022-03-15

modern x ray sources and analysis techniques such as lens less imaging combined with phase retrieval algorithms allow for resolving structure sizes in the nanometer range for this purpose optics have to be employed ensuring small focal spot dimensions simultaneously with high photon densities furthermore the wave front behind the optics is required to be smooth enabling for high resolution imaging combining all these properties x ray waveguides are well suited to perform this task since the intensity distribution behind the guide is restricted in two dimensions serving as a secondary quasi point source without wave front aberrations showing also a high divergence suitable for resolving fine features importantly the radiation provided by the waveguide reveals a high degree of coherence required by many imaging techniques the waveguide itself consists of an air filled channel embedded in a solid matrix typical materials are silicon germanium or quartz while the entrance area is nano sized the channel length is in the millimeter range this way posing challenges to fabricate high aspect ratio geometries since the functioning of x ray waveguides is based on the total reflection at small incident angles the surface roughness of the channel walls must be as low as possible to avoid scattering and hence loss of intensity to fulfill these demanding conditions a process scheme involving spin coating electron beam lithography wet development reactive ion etching and wafer bonding is optimized within this work to gain deeper insights into the principle of wave guiding finite difference simulations are performed also opening access for advanced design considerations such as gratings tapered and curved channels or beamsplitters enabling for constructing novel x ray tools as for example time delay devices or interferometers waveguides in all geometries are tested at synchrotron sources accomplishing new benchmarks in x ray optical performance here the x ray beam leaving the channel propagates out to a pixel array detector in the far field region from the recorded data the intensity distribution in the near field directly behind the waveguide is reconstructed revealing an outstanding agreement with the simulations and electron micrographs since the radiation field of the waveguide is well characterized and also tunable to meet the requirements of both the measurement setup and the sample they are suited of a broad field of applications in coherent x ray imaging

Arrayed Waveguide Gratings 2016

up to date coverage of the analysis and applications of coplanar waveguides to microwave circuits and antennas the unique feature of coplanar waveguides as opposed to more conventional waveguides is their uniplanar construction in which all of the conductors are aligned on the same side of the substrate this feature simplifies manufacturing and allows faster and less expensive characterization using on wafer techniques coplanar waveguide circuits components and systems is an engineer s complete resource collecting all of the available data on the subject rainee simons thoroughly discusses propagation parameters for conventional coplanar waveguides and includes valuable details such as the derivation of the fundamental equations physical explanations and numerical examples coverage also includes discontinuities and circuit elements transitions to other transmission media directional couplers hybrids and magic t microelectromechanical systems based switches and phase shifters tunable devices using ferroelectric materials photonic bandgap structures printed circuit antennas

OPTIMAL DESIGN OF WAVEGUIDE FILTER USING ARTIFICIAL INTELLIGENCE TECHNIQUES 2022-11-23

the aim of this thesis was to design novel waveguide structures and to analyze them in view of complex phenomena of near field propagation for this purpose experimental far field measurements were used in combination with finite difference simulations and phase retrieval methods two novel structures have been designed fabricated and characterized the waveguide array wga yielding several waveguided beams in transmission and multi guide resonate beam couplers rbcs tailored to yield two or several reflected beams two novel structures have been designed fabricated and characterized the wga yielding several waveguided beams in transmission and multi guide rbcs tailored to yield two or several reflected beams the wga and the multi guide rbcs are not only distinct in the coupling geometry a major difference is related to the fact that the wga principle is based on the separation non coupling of the different transmitted wavelets while the rbc functions are based on a strong coupling of guided radiation in several layers

Waveguide Structuring and Bragg Grating Fabrication by Ultraviolet Light Induced Refractive Index Changes in Photosensitive Optical Materials 2007

this book deals with theoretical and experimental aspects of solid state lasers including optimum waveguide design of end pumped and diode pumped lasers nonlinearity including the nonlinear conversion up frequency conversion and chirped pulse oscillators are discussed some new rare earth doped lasers including double borate and halide crystals and feedback in quantum dot semiconductor nanostructures are included

X-ray waveguide optics 2017

recently the rapid development of radiofrequency rf microwave and photonic optical waveguide technologies has had a significant impact on the current electronic industrial medical and information and communication technology fields this book is a self contained collection of valuable scholarly papers related to waveguide design modeling and applications this book contains 20 chapters that cover three main subtopics of waveguide technologies namely rf and microwave waveguide photonic and optical waveguide and waveguide analytical solutions hence this book is particularly useful to the academics scientists practicing researchers and postgraduate students whose work relates to the latest waveguide technologies

Coplanar Waveguide Circuits, Components, and Systems 2004-04-07

over the past decade or more the art relating to modern optical waveguides has evolved as a highly focused interdisciplinary field so attractive stimulating and full of far reaching promise that no parallel could be found earlier in other branches of applied sciences except perhaps in solid state electronics and computer technology this proceedings with a selection of 53 papers and briefs by 96 authors of 16 countries is of real international dimensions it is the outgrowth of the international symposium held June 20-23 1983 the first international meeting on this subject taking place in China since almost every country in the world eastern or western large or small has been involved in the study and promotion of this technological revolution it is only natural that China should be happy to serve as host country of the international meeting to promote an interchange of experiences and ideas conducive to greater achievements in the future

Advanced x-ray multilayer waveguide optics 2017

this book focuses on the design and development of SU-8 polymer and silicon waveguide based devices using the effective index based matrix method various fabrication techniques like laser direct writing LDW focused ion beam FIB and optical lithography are discussed FIB lithography has been explored for photonic crystal structures on the waveguide and for directional coupler in coupled region this technique is shown to be suitable in fabricating photonic crystal structures as well as for making any precise modifications in micro and nano meter photonic waveguide structures this book can be a useful reference for students researchers and fabrication engineers working in the areas of integrated optics optical communications laser technology and optical lithography for device manufacturing

Applications of Grating Waveguide Structures in Solid-State Lasers 2019-06-04

this book concentrates on the design and development of integrated optical waveguide sensors using silicon based materials the implementation of such system as a tool for detecting adulteration in petroleum based products as well as its use for detection of glucose level in diabetes are highlighted the first chapters are dedicated to the development of the theoretical model while the final chapters are focused on the different applications of such sensors it gives the readers the full background in the field of sensors reasons for using silicon oxynitride as a potential waveguide material as well as its fabrication processes and possible uses

Design, Manufacturing, and Testing of Planar Optical Waveguide Devices 2001

Solid State Laser 2012-02-17

Superconducting Nanowire Single-Photon Detectors for Quantum Photonic Integrated Circuits on GaAs 2020-07-09

The Design of Topwall Waveguide Directional Couplers 1991

Telecommunication Alternatives with Emphasis on Optical Waveguide Systems 1975

Emerging Waveguide Technology 2018

Optical Waveguide Sciences 1983-05-31

Photonic Waveguide Components on Silicon Substrate 2019-11-16

Integrated Optoelectronics 2002

**A Design Procedure for Waveguide Microwave Time-delay Filters
1966**

Planar Waveguide Optical Sensors 2016-08-30

Microwave Circulator Design 1989

***Analysis and Design of Substrate Integrated Waveguide Cavity Filter
for Microwave & Millimeter Wave Applications 2005***

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