Matlab Code For Optical Waveguide

Ultrashort pulses in mode-locked lasers are receiving focused attention from researchers looking to apply them in a variety of fields, from optical clock technology to measurements of the fundamental constants of nature and ultrahigh-speed optical communications. Ultrashort pulses are especially important for the next generation of ultrahigh-speed optical systems and networks operating at 100 Gbps per carrier. Ultra Fast Fiber Lasers: Principles and Applications with MATLAB® Models is a self-contained reference for engineers and others in the fields of applied photonics and optical communications. Covering both fundamentals and advanced research, this book includes both theoretical and experimental results. MATLAB files are included to provide a basic grounding in the simulation of the generation of short pulses and the propagation or circulation around nonlinear fiber rings. With its unique and extensive content, this volume— Covers fundamental principles involved in the generation of ultrashort pulses employing fiber ring lasers, particularly those that incorporate active optical modulators of amplitude or phase types Presents experimental techniques for the generation, detection, and characterization of ultrashort pulse sequences derived from several current schemes Describes the multiplication of ultrashort pulse sequences using the Talbot diffraction effects in the time domain via the use of highly dispersive media Discusses developments of multiple short pulses in the form of solitons binding together by phase states Elucidates the generation of short pulse sequences and multiple wavelength channels from a single fiber laser The most practical short pulse sources are always found in the form of guided wave photonic structures. This minimizes problems with alignment and eases coupling into fiber transmission systems. In meeting these requirements, fiber ring lasers operating in active mode serve well as suitable ultrashort pulse sources. It is only a matter of time before scientists building on this research develop the practical and easy-to-use applications that will make ultrahigh-speed optical systems universally available.

This book is a collection of papers that originated as a Special Issue, focused on some recent advances related to fiber Bragg grating-based sensors and systems. Conventionally, this book can be divided into three parts: intelligent systems, new types of sensors, and original interrogators. The intelligent systems presented include evaluation of strain transition properties between cast-in FBGs and cast aluminum during uniaxial straining, multi-point strain measurements on a containment vessel, damage detection methods based on long-gauge FBG for highway bridges, evaluation of a coupled sequential approach for rotorcraft landing simulation, wearable hand modules and real-time tracking algorithms for measuring finger joint angles of different hand sizes, and glaze icing detection of 110 kV composite insulators. New types of sensors are reflected in multi-addressed fiber Bragg structures for microwave–photonic sensor systems, its applications in load-sensing wheel hub bearings, and more complex influence in problems of generation of vortex optical beams based on chiral fiber-optic periodic structures. Original interrogators include research in optical designs with curved detectors for FBG interrogation monitors; demonstration of a filterless, multi-point, and temperature-independent FBG dynamical demodulator using pulse-width modulation; and dual wavelength differential detection of FBG sensors with a pulsed DFB laser.

From design and simulation through to testing and fabrication, this hands-on introduction to silicon photonics engineering equips students with everything they need to begin creating foundry-ready designs. In-depth discussion of real-world issues and fabrication challenges ensures that students are fully equipped for careers in industry. Step-by-step tutorials, straightforward examples, and illustrative source code fragments guide students through every aspect of the design process, providing a practical framework for developing and refining key skills. Offering industry-ready expertise, the text supports existing PDKs for CMOS UV-lithography foundry services (OpSIS, ePIXfab, imec, LETI, IME and CMC) and the development of new kits for proprietary processes and clean-room based research. Accompanied by additional online resources to support students, this is the perfect learning package for senior undergraduate and graduate students studying silicon photonics design, and academic and industrial researchers involved in the development and manufacture of new silicon photonics systems.

Optical Fiber Biosensors: Device Platforms, Biorecognition, Applications provides a comprehensive overview of the field of fiber optic sensors using an interdisciplinary approach that covers the fabrication of sensing devices and optical hardware, the functionalization to perform selective biorecognition, and the main applications of biosensors, with a present and a future outlook. Chapters discuss the principles of light propagation and the sensing devices suitable to perform biosensing with optical fibers, the process to functionalize the previous devices to selective biosensing, and applications in cells, small molecules, biomarkers and protein sensing, with a birds eye view on the most important results. This book provides a coherent picture of fiber optic biosensors, from the start (the device) to the end (the application), explaining in simple terms what is the whole process for development of a biosensor. The book also contains practical material (e.g. commercial instruments, fabrication instructions, medical standards for biocompatibility) that cannot be easily found elsewhere, and this is very useful for researchers to plan their development and build their labs. Covers the technologies and operating principles of optical fiber devices used in biosensing Contains chapters on the chemistry and operational strategy to functionalize a fiber device to become an effective biosensor Addresses the main applications of fiber optic biosensors and their specialization

Theory and Practice with MATLAB® and Simulink® Models
Fundamentals with MATLAB® Modelling
Proceedings of the AISEM 2020 Regional Workshop
Contemporary Optical Image Processing with MATLAB
Supercontinuum Generation in Optical Fibers
Fractal Apertures in Waveguides, Conducting Screens and Cavities

This book presents selected papers from 1st International Conference on Optical and Wireless Technologies, providing insights into the analytical, experimental, and developmental aspects of systems, techniques, and devices in these spheres. It explores the combined use of various optical and wireless technologies in next-generation networking applications, and discusses the latest developments in applications such as photonics, high-speed communication systems and networks, visible light communication, nanophotonics, and wireless and multiple-input-multiple-output (MIMO) systems. The book will serve as a valuable reference resource for academics and researchers across the globe.

This practical resource provides you with a comprehensive understanding of error control coding, an essential and widely applied area in modern digital communications. The goal of error control coding is to encode information in such a way that even if the channel (or storage medium) introduces errors, the receiver can correct the errors and recover the original transmitted information. This book includes the most useful modern and classic codes, including block, Reed Solomon, convolutional, turbo, and LDPC codes.You find clear guidance on code construction, decoding algorithms, and error correcting performances. Moreover, this unique book introduces computer simulations integrally to help you master key concepts. Including a companion DVD with MATLAB programs and supported with over 540 equations, this hands-on reference provides you with an in-depth treatment of a wide range of practical implementation issues.

This book constitutes the refereed proceedings of the International Conference on Advances in Computing Communications and Control, ICAC3 2011, held in Mumbai, India, in January 2011. The 84 revised full papers presented were carefully reviewed and selected from 309 submissions. The papers address issues such as AI, artificial neural networks, computer graphics, data warehousing and mining, distributed computing, geo information and statistical computing, learning algorithms, system security, virtual reality, cloud computing, service oriented architecture, semantic web, coding techniques, modeling and simulation of communication systems, network architecture, network protocols, optical fiber/microwave communication, satellite communication, speech/image processing, wired and wireless communication, cooperative control, and nonlinear control, process control and instrumentation, industrial automation, controls in aerospace, robotics, and power systems.

Carefully structured to provide practical knowledge on fundamental issues, Optical Fiber Communications Systems: Theory and Practice with MATLAB® and Simulink® Models explores advanced modulation and transmission techniques of lightwave communication systems. With coverage ranging from fundamental to modern aspects, the text presents optical communication techniques and applications, employing single mode optical fibers as the transmission medium. With MATLAB and Simulink models that illustrate methods, it supplies a deeper understanding of future development of optical systems and networks. The book begins with an overview of the development of optical fiber communications technology over the last three decades of the 20th century. It describes the optical transmitters for direct and external modulation technique and discusses the detection of optical signals under direct coherent and incoherent reception. The author also covers lumped Er:doped and distributed Roman optical amplifiers with extensive models for the amplification of signals and structuring the amplifiers on the Simulink platform. He outlines a design strategy for optically amplified transmission systems coupled with MATLAB Simulink models, including dispersion and attenuation budget methodology and simulation techniques. The book concludes with coverage of advanced modulation formats for long haul optical fiber transmission systems with accompanied Simulink models. Although many books have been written on this topic over the last two decades, most of them present only the theory and practice of devices and subsystems of the optical fiber communications systems in the fields, but do not illustrate any computer models to represent the true practical aspects of engineering practice. This book fills the need for a text that emphasizes practical computing models that shed light on the behavior and dynamics of the devices.

Optical Fiber Communications Systems
Sensors and Microsystems
Device Platforms, Biorecognition, Applications
An Introduction with MATLAB
Introduction to Optical Waveguide Analysis
Silicon Photonics Design

*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.*

This invaluable second edition provides more in-depth discussions and examples in various chapters. Based largely on the authors' own in-class lectures as well as research in the area, the comprehensive textbook serves two purposes. The first introduces some traditional topics such as matrix formalism of geometrical optics, wave propagation and diffraction, and some fundamental background on Fourier optics. The second presents the essentials of acousto-optics and electro-optics, and provides the students with experience in modeling the theory and applications using a commonly used software tool MATLAB®. Request Inspection Copy

The great interest in photonic crystals and their applications in the last 15 years is being expressed in the publishing of a large number of monographs, collections, textbooks and tutorials, where existing knowledge concerning – eration principles of photonic crystal devices and microstructured ?bers, their mathematicaldescription,well-knownandnovelapplicationsofsuchtechno- gies in photonics and optical communications are presented. They challenges authors of new books to cover the gaps still existing in the literature and highlight and popularize of already known material in a new and original manner. Authorsofthisbookbelievethatthenextsteptowardswideapplicationof photoniccrystalsisthesolutionofmanypracticalproblemsofdesignandc- putation of the speci?c photonic crystal-based devices aimed at the speci?c technicalapplication.Inordertomakethistep,itisnecessarytoincreasethe number of practitioners who can solve such problems independently. The aim of this book is to extend the group of researchers, developers and students, who could practically use the knowledge on the physics of photonic crystals and modeling of various elements of – tegrated circuits and optical communication systems created on the basis of photonic crystals. The book is intended for quali?ed readers, specialists in the ?eld of optics and photonics, students of higher courses, master degree students and PhD students. As an introduction to the snopest, the book contains the basics of wave optics and radiation propagation in simple guiding media such as planar waveguides and step-index ?bers.

Information networking has emerged as a multidisciplinary diversified area of research over the past few decades. From traditional wired telephony to cellular voice telephony and from wired access to wireless access to the Internet, information networks have profoundly impacted our lifestyles as they have undergone enormous growth. To understand this technology, students need to learn several disciplines and develop an intuitive feeling of how they interact with one another. To achieve this goal, the book describes important networking standards, classifying their underlying technologies in a logical manner and gives detailed examples of successful applications. The emergence of wireless access and dominance of the Ethernet in LAN technologies has shifted the innovations in networking towards the physical layer and characteristics of the medium. This book pays attention to the physical layer while we provide fundamentals of information networking technologies which are used in wired and wireless networks designed for local and wide area operations. The book provides a comprehensive treatment of the wired IEEE802.3 Ethernet, and Internet as well as ITU cellular 2G-6G wireless networks, IEEE 802.11 for Wi-Fi, and IEEE 802.15 for Bluetooth, ZigBee and ultra-wideband (UWB) technologies. The novelty of the book is that it places emphasis on physical communications issues related to formation and transmission of packets and characteristics of the medium for transmission in a variety of networks. Material presented in the book will be beneficial for students of Electrical and Computer Engineering, Computer Science, Robotics Engineering, Biomedical Engineering, or other disciplines who are interested in integration of navigation into their multi-disciplinary projects. The book provides examples with supporting MATLAB codes and hands-on projects throughout to improve the ability of the readers to understand and implement a variety of algorithms.

Light Transmission Optics
Guided Wave Photonics

Principles and Applications with MATLAB® Models
Solving Maxwell's Equation and the Schr®dinger Equation
Physics and Practical Modeling

Since the 3rd edition appeared, a fast evolution of the field has occurred. The fourth edition of this classic work provides an up-to-date account of the nonlinear phenomena occurring inside optical fibers. The contents include such important topics as self- and cross-phase modulation, stimulated Raman and Brillouin scattering, four-wave mixing, modulation instability, and optical solitons. Many new figures have been added to help illustrate the concepts discussed in the book. New to this edition are chapters on highly nonlinear fibers and and the novel nonlinear effects that have been observed in these fibers since 2000. Such a chapter should be of interest to people in the field of new wavelengths generation, which has potential application in medical diagnosis and treatments, spectroscopy, new wavelength lasers and light sources, etc. Continues to be industry bestseller providing unique source of comprehensive coverage on the subject of nonlinear fiber optics Fourth Edition is a completely up-to-date treatment of the nonlinear phenomena occurring inside optical fibers Includes 2 NEW CHAPTERS on the properties of highly nonlinear fibers and their novel nonlinear effects

This book is designed to supplement standard texts and teaching material in the areas of differential equations in engineering such as in Electrical ,Mechanical and Biomedical engineering. Emphasis is placed on the Boundary Value Problems that are often met in these fields.This keeps the the spectrum of the book rather focussed .The book has basically emerged from the need in the authors lectures on "Advanced Numerical Methods in Biomedical Engineering" at Yeditepe University and it is aimed to assist the students in solving general and application specific problems in Science and Engineering at upper-undergraduate and graduate level.Majority of the problems given in this book are self-contained and have varying levels of difficulty to encourage the student. Problems that deal with MATLAB simulations are particularly intended to guide the student to understand the nature and demystify theoretical aspects of these problems. Relevant references are included at the end of each chapter. Here one will also find large number of software that supplements this book in the form of MATLAB script (.m files). The name of the files used for the solution of a problem are indicated at the end of each corresponding problem statement.There are also some exercises left to students as homework assignments in the book. An outstanding feature of the book is the large number and variety of the solved problems that are included in it. Some of these problems can be found relatively simple, while others are more challenging and used for research projects. All solutions to the problems and script files included in the book have been tested using recent MATLAB software.The features and the content of this book will be most useful to the students studying in Engineering fields, at different levels of their education (upper undergraduate-graduate).

Soft and Stiffness-controllable Robotics Solutions for Minimally Invasive Surgery presents the results of a research project, funded by European Commission, STIFF-FLOP: STIFFness controllable Flexible and Learn-able manipulator for surgical Operations. In Minimally Invasive Surgery (MIS), tools go through narrow openings and manipulate soft organs that can move, deform, or change stiffness. There are limitations on modern laparoscopic and robot-assisted surgical systems due to restricted access through Trocar ports, lack of haptic feedback, and difficulties with rigid robot tools operating inside a confined space filled with organs. Also, many control algorithms suffer from stability problems in the presence of unexpected conditions. Yet biological "manipulators", like the octopus arm can manipulate objects while controlling the stiffness of selected body parts and being inherently compliant when interacting with objects. STIFF-FLOP robot is an innovative soft robotic arm that can squeeze through a standard MIS, reconfigure itself and stiffen by hydrostatic actuation to perform compliant force control tasks while facing unexpected situations. Technical topics discussed in the book include: Soft actuatorsContinuum soft manipulatorsControl, kinematics and navigation of continuum manipulatorsOptical sensors for force, torque, and curvatureHaptic feedback and human interface for surgical systemsValidation of soft stiffness controllable robots

This book deals with the design and analysis of fractal apertures in waveguides, conducting screens and cavities using numerical electromagnetics and field-solvers. The aim is to obtain design solutions with improved accuracy for a wide range of applications. To achieve this goal, a few diverse problems are considered. The book is organized with adequate space dedicated for the design and analysis of fractal apertures in waveguides, conducting screens and cavities, microwave/millimeter wave applications followed by detailed case-study problems to infuse better insight and understanding of the subject. Finally, summaries and suggestions are given for future work. Fractal geometries were widely used in electromagnetics, specifically for antennas and frequency selective surfaces (FSS). The self-similarity of fractal geometry gives rise to a multiband response, whereas the space-filling nature of the fractal geometries makes it an efficient element in antenna and FSS unit cell miniaturization. Until now, no efforts were made to study the behavior of these fractal geometries for aperture coupling problems. The aperture coupling problem is an important boundary value problem in electromagnetics and used in waveguide filters and power dividers, slotted ground planes, frequency selective surfaces and metamaterials. The present book is intended to initiate a study of the characteristics of fractal apertures in waveguides, conducting screens and cavities. To perform a unified analysis of these entirely dissimilar problems, the "generalized network formulation of the aperture problems" by Mautz and Harrington was extended to multiple-aperture geometry. The authors consider the problem of coupling between two arbitrary regions coupled together via multiple apertures of arbitrary shape. MATLAB codes were developed for the problems and validated with the results available in the literature as well as through simulations on ANSOFT's HFSS.

Proceedings of OWT 2017
Digital Signal Processing In High-Speed Optical Fiber Communication Principle and Application
Optical Fiber Biosensors
Simulations and Optical Diagnostics for Internal Combustion Engines
Computational Photonics
Essentials of Modern Communications

This book presents a theoretical description of fiber Bragg gratings, focusing on channels' densification and the tunability of Bragg filters. It also includes a full Matlab code for the synthesis and optimization of several kinds of fiber Bragg gratings by using the directed tabu search, the simulated annealing method and the genetic algorithm. Physical and optical parameters of uniform, chirped and sampled fiber Bragg gratings are then reconstructed with these algorithms.

This comprehensive, modular treatment of the challenging issues involved in very high-speed optical transmission systems contains all the theory and practical design criteria required to optimise transmission system design. Each chapter covers the theoretical modelling of a given system; chapters are well supported by real-world worked examples and accompanied by MATLAB code and receiver design examples. Critical analysis and comparison of engineering solutions is presented, to make clear the principles underlying system performance optimisation, and a broad range of transmission systems is discussed, including the status and performance demands of the Terabit systems now entering the next generation market. Blending theoretical and practical considerations for high-speed fibre optic systems design, this is an indispensable reference for all forward-looking professionals and researchers in optical communications.

Detailing a systems approach, Optical Wireless Communications: System and Channel Modelling with MATLAB®, is a self-contained volume that concisely and comprehensively covers the theory and technology of optical wireless communications systems (OWC) in a way that is suitable for undergraduate and graduate-level students, as well as researchers and professional engineers. Incorporating MATLAB® throughout, the authors highlight past and current research activities to illustrate optical sources, transmitters, detectors, receivers, and other devices used in optical wireless communications. They also discuss both indoor and outdoor environments, discussing how different factors—including various channel models—affect system performance and mitigation techniques. In addition, this book broadly covers crucial aspects of OWC systems: Fundamental principles of OWC Devices and systems Modulation techniques and schemes (including polarization shift keying) Channel models and system performance analysis Emerging visible light communications Terrestrial free space optics communication Use of infrared in indoor OWC One entire chapter explores the emerging field of visible light communications, and others describe techniques for using theoretical analysis and simulation to mitigate channel impact on system performance. Additional topics include wavelet denoising, artificial neural networks, and spatial diversity. Content also covers different challenges encountered in OWC, as well as outlining possible solutions and current research trends. A major attraction of the book is the presentation of MATLAB simulations and codes, which enable readers to execute extensive simulations and better understand OWC in general.

This book showcases the state of the art in the field of sensors and microsystems, revealing the impressive potential of novel methodologies and technologies. It covers a broad range of aspects, including: bio-, physical and chemical sensors, actuators, micro- and nano-structured materials, mechanisms of interaction and signal transduction, polymers and biomaterials, sensor electronics and instrumentation, analytical microsystems, recognition systems and signal analysis and sensor networks as well as manufacturing technologies, environmental, food, energy and biomedical applications. The book gathers a selection of papers presented at the AISEM Regional Workshop on Sensors and Microsystems, held in Portici (Naples), Italy in February 2020.

Numerical Simulation of Optical Wave Propagation with Examples in MATLAB
Noise and Signal Interference in Optical Fiber Transmission Systems
Grating-assisted Glass Waveguide Devices and Fiber-optic Parametric Amplifiers for Optical Communication Systems
Theory and Design of Terabit Optical Fiber Transmission Systems
Learning by Computing, with Examples Using Maple, MathCad®, Matlab®, Mathematica®, and Maple®
Optical and Wireless Technologies

This book presents the principles and applications of optical fiber communication based on digital signal processing (DSP) for both single and multi-carrier modulation signals. In the context of single carrier modulation, it describes DSP for linear and nonlinear optical fiber communication systems, discussing all-optical Nyquist modulation signal generation and processing, and how to use probabilistic and geometrical shaping to improve the transmission performance. For multi-carrier modulation, it examines DSP-based OFDM signal generation and detection and presents 4D and high-order modulation formats. Lastly, it demonstrates how to use artificial intelligence in optical fiber communication. As such it is a useful resource for students, researches and engineers in the field of optical fiber communication.

Carefully structured to instill practical knowledge of fundamental issues, Optical Fiber Communication Systems with MATLAB® and Simulink®. This lecture-based book focuses on concepts and interpretation, mathematical procedures, and engineering applications, shedding light on device behavior and dynamics through computer modeling. Supplying a deeper understanding of the current and future state of optical systems and networks, this Second Edition: Reflects the latest developments in optical fiber communications technology Includes new and updated case studies, examples, end-of-chapter problems, and MATLAB® and Simulink® models Emphasizes DSP-based coherent reception techniques essential to advancement in short- and long-term optical transmission networks Optical Fiber Communication Systems with MATLAB® and Simulink® Models, Second Edition is intended for use in university and professional training courses in the specialized field of optical communications. This text should also appeal to students of engineering and science who have already taken courses in electromagnetic theory, signal processing, and digital communications, as well as to optical engineers, designers, and practitioners in industry.

Numerical Simulation of Optical Wave Propagation is solely dedicated to wave-optics simulations. The book discusses digital Fourier transforms (FT), FT-based operations, multiple methods of wave-optics simulations, sampling requirements, and simulations in atmospheric turbulence.

This book serves two purposes: first to introduce readers to the concepts of geometrical optics, physical optics and techniques of optical imaging and image processing, and secondly to provide them with experience in modeling the theory and applications using the commonly used software tool MATLAB®. A comprehensively revised version of the authors' earlier book Principles of Applied Optics, Contemporary Optical Image Processing with MATLAB brings out the systems aspect of optics. This includes ray optics, Fourier Optics, Gaussian beam propagation, the split-step beam propagation method, holography and complex spatial filtering, ray theory of holograms, optical scanning holography, acousto-optic image processing, edge enhancement and correlation using photorefractive materials, holographic phase distortion correction, to name a few. MATLAB examples are given throughout the text. MATLAB is emphasized since it is now a widely accepted software tool very routinely used in signal processing. A sizeable portion of this book is based on the authors' own in-class presentations, as well as research in the area. Instructive problems and MATLAB assignments are included at the end of each Chapter to enhance even further the value of this book to its readers. MATLAB is a registered trademark of The MathWorks, Inc.

Boundary Value Problems for Engineers
Optical Wireless Communications
A Practical Guide to Error-Control Coding Using MATLAB
Fundamentals and Applications with MATLAB
Engineering Optics with MATLAB
Soft and Stiffness-controllable Robotics Solutions for Minimally Invasive Surgery: The STIFF-FLOP Approach

The optical fiber based supercontinuum source has recently become a significant scientific and commercial success, with applications ranging from frequency comb production to advanced medical imaging. This one-of-a-kind book explains the theory of fiber supercontinuum broadening, describes the diverse operational regimes and indicates principal areas of applications, making it a very important guide for researchers and graduate students. With contributions from major figures and groups who have pioneered research in this field, the book describes the historical development of the subject, provides a background to the associated nonlinear optical processes, treats the generation mechanisms from continuous wave to femtosecond pulse pump regimes and highlights the diverse applications. A full discussion of numerical methods and comprehensive computer code are also provided, enabling readers to confidently predict and model supercontinuum generation characteristics under realistic conditions.

A comprehensive manual on the efficient modeling and analysis of photonic devices through building numerical codes, this book provides graduate students and researchers with the theoretical background and MATLAB programs necessary for them to start their own numerical experiments. Beginning by summarizing topics in optics and electromagnetism, the book discusses optical planar waveguides, linear optical fiber, the propagation of linear pulses, laser diodes, optical amplifiers, optical receivers, finite-difference time-domain method, beam propagation method and some wavelength division devices, solitons, solar cells and metamaterials. Assuming only a basic knowledge of physics and numerical methods, the book is ideal for engineers, physicists and practising scientists. It concentrates on the operating principles of optical devices, as well as the models and numerical methods used to describe them.

A comprehensive presentation of the theory and simulation of optical waveguides and wave propagations in a guided environment, Guided Wave Photonics: Fundamentals and Applications with MATLAB supplies fundamental and advanced understanding of integrated optical devices that are currently employed in modern optical fiber communications systems and p

This textbook details the architecture of a digital coherent optical system and describes its main digital signal processing (DSP) algorithms. The authors first show how the combination of advanced modulation techniques, DSP and coherent detection has led to significant gains in capacity and ease of operation. The authors follow the path of the information from its generation in the transmitter, to propagation through the fiber and processing by the DSP algorithms in the receiver. The work summarizes academic results and presents them in a didactic way to students and practitioners working on the area of optical communications. A full suite of classroom materials is included for easy integration into a curriculum, containing theoretic and simulation problems, and off-the-shelf Matlab/Octave functions.

International Conference, ICAC3 2011, Mumbai, India, January 28-29, 2011. Proceedings
Fiber Bragg Grating Based Sensors and Systems
Digital Coherent Optical Systems
with MATLAB Solutions
Fiber Lasers
System and Channel Modelling with MATLAB®

Over the past two decades, the use of fiber lasers in engineering applications has gradually become established as an engineering discipline on its own. The development of fiber lasers is mainly the result of studies from various domains like photonics, optical sensing, fiber optics, nonlinear optics, and telecommunication. Though many excellent books exist on each of these subjects, and several have been written specifically to address lasers and fiber lasers, it is still difficult to find one book where the diverse core of subjects that are central to the study of fiber laser systems are presented in simple and straight forward way. Fiber Lasers: Fundamentals with MATLAB Modelling, is an introduction to the fundamentals of fiber lasers. It provides clear explanations of physical concepts supporting the field of fiber lasers. Fiber lasers' characteristics are analyzed theoretically through simulations derived from numerical models. The authors cover fundamental principles involved in the generation of laser light through both continuous-wave (CW) and pulsing. It also covers experimental configuration and characterization for both CW and Q-switching. The authors describe the simulation of fiber laser systems and propose numerical modelling of various fiber laser schemes. MATLAB® modelling and numerical computational methods are used throughout the book to simulate different fiber laser system configurations. This book will be highly desirable and beneficial for both academics and industry professionals to have ample examples of fiber laser approaches that are well thought out and fully integrated with the subjects covered in the text. This book is written to address these needs.

A comprehensive reference to noise and signal interference in optical fiber communications Noise and Signal Interference in Optical Fiber Transmission Systems is a compendium on specific topics within optical fiber transmission and the optimization process of the system design. It offers comprehensive treatment of noise and intersymbol interference (ISI) components affecting optical fiber communications systems, containing coverage on noise from the light source, the fiber and the receiver. The ISI is modeled with a statistical approach, leading to new useful computational methods. The author discusses the subject with the help of numerous applications and simulations of noise and signal interference theory. Key features: Complete all-in-one reference on the subject for engineers and designers of optical fiber transmission systems Discusses the physical principles behind several noise contributions encountered in the optical communications systems design, including contributions from the light source, the fiber and the receiver Covers the theory of the ISI for the binary signal, as well as noise statistics Discusses the theory and the mathematical models of the numerous noise components (such as optical noise, photodetection noise and reflection noise) Introduces the frequency description of the ISI and provides new calculation methods based on the characteristic functions Provides useful tools and examples for optimum design of optical fiber transmission networks and systems This book will serve as a comprehensive reference for researchers, R & D engineers, developers and designers working on optical transmission systems and optical communications. Advanced students in optical communications and related fields will also find this book useful.

Explore Modern Communications and Understand Principles of Operations, Appropriate Technologies, and Elements of Design of Communication Systems Modern society requires a different set of communication systems than has any previous generation. To maintain and improve the contemporary communication systems that meet ever-changing requirements, engineers need to know how to recognize and solve cardinal problems. In Essentials of Modern Communications, readers will learn how modern communication has expanded and will discover where it is likely to go in the future. By discussing the fundamental principles, methods, and techniques used in various communication systems, this book helps engineers assess, troubleshoot, and fix problems that are likely to occur. In this reference, readers will learn about topics like: How communication systems respond in time and frequency domains Principles of analog and digital modulations Application of spectral analysis to modern communication systems based on the Fourier series and Fourier transform Specific examples and problems, with discussions around their optimal solutions, limitations, and applications Approaches to solving the concrete engineering problems of modern communications based on critical, logical, creative, and out-of-box thinking For readers looking for a resource on the fundamentals of modern communications and the possible issues they face, Essentials of Modern Communications is instrumental in educating on real-life problems that engineering students and professionals are likely to encounter.

This new edition is intended for a one semester course in optics for juniors and seniors in science and engineering. It uses scripts from Maple, MathCad, Mathematica, and MATLAB to provide a simulated laboratory where students can learn by exploration and discovery instead of passive absorption. The text covers all the standard topics of a traditional optics course. It contains step by step derivations of all basic formulas in geometrical, wave and Fourier optics. The threefold arrangement of text, applications, and files makes the book suitable for "self-learning" by scientists or engineers who would like to refresh their knowledge of optics.

From Devices to Systems
An Optimum Design Approach
Frontiers in Optics and Photonics
Nonlinear Fiber Optics
Optical Fiber Communication Systems with MATLAB® and Simulink® Models, Second Edition
Ultra-Fast Fiber Lasers

This book provides a cutting-edge research overview on the latest developments in the field of Optics and Photonics. All chapters are authored by the pioneers in their field and will cover the developments in Quantum Photonics, Optical properties of 2D Materials, Optical Sensors, Organic Opto-electronics, Nanophotonics, Metamaterials, Plasmonics, Quantum Cascade lasers, LEDs, Biophotonics and biomedical photonics and spectroscopy.

This book focuses on combustion simulations and optical diagnostics techniques, which are currently used in internal combustion engines. The book covers a variety of simulation techniques, including in-cylinder combustion, numerical investigations of fuel spray, and effects of different fuels and engine technologies. The book includes chapters focused on alternative fuels such as DEE, biomass, alcohols, etc. It provides valuable information about alternative fuel utilization in IC engines. Use of combustion simulations and optical techniques in advanced techniques such as microwave-assisted plasma ignition, laser ignition, etc. are few other important aspects of this book. The book will serve as a valuable resource for academic researchers and professional automotive engineers alike.

Guided Wave PhotonicsFundamentals and Applications with MATLABCRC Press

Most available books on computational electrodynamics are focused on FDTD, FEM, or other specific technique developed in microwave engineering. In contrast, Fourier Modal Method and Its Applications in Computational Nanophotonics is a complete guide to the principles and detailed mathematics of the up-to-date Fourier modal method of optical analysis. It takes readers through the implementation of MATLAB® codes for practical modeling of well-

known and promising nanophotonic structures. The authors also address the limitations of the Fourier modal method. Features Provides a comprehensive guide to the principles, methods, and mathematics of the Fourier modal method Explores the emerging field of computational nanophotonics Presents clear, step-by-step, practical explanations on how to use the Fourier modal method for photonics and nanophotonics applications Includes the necessary MATLAB codes, enabling readers to construct their own code Using this book, graduate students and researchers can learn about nanophotonics simulations through a comprehensive treatment of the mathematics underlying the Fourier modal method and examples of practical problems solved with MATLAB codes.

Advances in Computing, Communication and Control

Optics

Analysis and Design

Understanding Communications Networks for Emerging Cybernetics Applications

Full Matlab Code for Synthesis and Optimization of Bragg Gratings

Fourier Modal Method and Its Applications in Computational Nanophotonics