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This book covers the principles of modeling and simulation of nonlinear distortion in wireless communication systems with MATLAB simulations and techniques In this book, the author describes the principles of modeling and simulation of nonlinear distortion in single and multichannel wireless communication systems using both deterministic and stochastic signals. Models and simulation methods of nonlinear amplifiers explain in detail how to analyze and evaluate the performance of data communication links under nonlinear amplification.

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The book addresses the analysis of nonlinear systems with stochastic inputs and establishes the performance metrics of communication systems with regard to nonlinearity. In addition, the author also discusses the problem of how to embed models of distortion in system-level simulators such as MATLAB and MATLAB Simulink and provides practical techniques that professionals can use on their own projects. Finally, the book explores simulation and programming issues and provides a comprehensive reference of simulation tools for nonlinearity in wireless communication systems. Key Features: Covers the theory, models and simulation tools needed for understanding nonlinearity and nonlinear distortion in wireless systems Presents simulation and modeling techniques for nonlinear

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distortion in wireless channels using MATLAB Uses random process theory to develop simulation tools for predicting nonlinear system performance with real-world wireless communication signals Focuses on simulation examples of real-world communication systems under nonlinearity Includes an accompanying website containing MATLAB code This book will be an invaluable reference for researchers, RF engineers, and communication system engineers working in the field. Graduate students and professors undertaking related courses will also find the book of interest.

This book provides an excellent reference to the MIMO radio channel In this book, the authors introduce the concept of the Multiple Input Multiple Output (MIMO) radio channel, which is

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an intelligent communication method based upon using multiple antennas. Moreover, the authors provide a summary of the current channel modeling approaches used by industry, academia, and standardisation bodies. Furthermore, the book is structured to allow the reader to easily progress through the chapters in order to gain an understanding of the fundamental and mathematical principles behind MIMO. It also provides examples (i.e. Kronecker model, Weichselberger model, geometric and deterministic models, and ray tracing), system scenarios, trade-offs, and visual explanations. The authors explain and demonstrate the use and application of these models at system level. Key Features: Provides a summary of the current channel modeling approaches

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used by industry, academia and standardisation bodies Contains experimental and measurement based results Provides a comprehensive down to earth approach with concise and visual explanations of MIMO Radio Channel Covers a variety of system scenarios and explains the trade-offs involved in each Accompanying website containing MATLAB code and solutions to related problems (<http://www.tim.brown76.name/MIMObook>) Practical Guide to the MIMO Radio Channel with MATLAB examples is an invaluable reference for R&D engineers and professionals in industry requiring familiarisation with the concept, and engineers entering the field or working in related fields seeking an introduction to the topic. Postgraduate and graduate students will also find this book of interest.

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With the current advances in technology innovation, the field of medicine and healthcare is rapidly expanding and, as a result, many different areas of human health diagnostics, treatment and care are emerging. Wireless technology is getting faster and 5G mobile technology allows the Internet of Medical Things (IoMT) to greatly improve patient care and more effectively prevent illness from developing. This book provides an overview and review of the current and anticipated changes in medicine and healthcare due to new technologies and faster communication between users and devices. This groundbreaking book presents state-of-the-art chapters on many subjects including: A review of the implications of VR and AR healthcare applications

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A review of current augmenting dental care
An overview of typical human-computer interaction (HCI) that can help inform the development of user interface designs and novel ways to evaluate human behavior to responses in virtual reality (VR) and other new technologies
A review of telemedicine technologies
Building empathy in young children using augmented reality
AI technologies for mobile health of stroke monitoring & rehabilitation
robotics control
Mobile doctor brain AI App
An artificial intelligence mobile cloud computing tool
Development of a robotic teaching aid for disabled children
Training system design of lower limb rehabilitation robot based on virtual reality

Based on the popular Artech House classic, Digital Communication

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Systems Engineering with Software-Defined Radio, this book provides a practical approach to quickly learning the software-defined radio (SDR) concepts needed for work in the field. This up-to-date volume guides readers on how to quickly prototype wireless designs using SDR for real-world testing and experimentation. This book explores advanced wireless communication techniques such as OFDM, LTE, WLA, and hardware targeting. Readers will gain an understanding of the core concepts behind wireless hardware, such as the radio frequency front-end, analog-to-digital and digital-to-analog converters, as well as various processing technologies. Moreover, this volume includes chapters on timing estimation, matched filtering, frame synchronization message decoding,

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and source coding. The orthogonal frequency division multiplexing is explained and details about HDL code generation and deployment are provided. The book concludes with coverage of the WLAN toolbox with OFDM beacon reception and the LTE toolbox with downlink reception. Multiple case studies are provided throughout the book. Both MATLAB and Simulink source code are included to assist readers with their projects in the field.

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

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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 Raman optical amplifiers with extensive models for the amplification of signals and structuring

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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

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models that shed light on the behavior and dynamics of the devices.

Emerging Technologies for Health and Medicine

Nonlinear Distortion in Wireless Systems

OFDM Systems for Wireless Communications

Digital Communication Systems Using MATLAB and Simulink

Modeling and Simulation with MATLAB

This paperback is a color edition. Link to the black & white edition: <https://www.amazon.com/gp/product/152149388X> Digital Modulations using Matlab is a learner-friendly, practical and example driven book, that

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gives you a solid background in building simulation models for digital modulation systems in Matlab. This book, an essential guide for understanding the implementation aspects of a digital modulation system, shows how to simulate and model a digital modulation system from scratch. The implemented simulation models shown in this book, mostly will not use any of the inbuilt communication toolbox functions and hence provide an opportunity for an engineer to understand the basic implementation

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aspects of modeling various building blocks of a digital modulation system. It presents the following key topics with required theoretical background along with the implementation details in the form of Matlab scripts. * Basics of signal processing essential for implementing digital modulation techniques - generation of test signals, interpreting FFT results, power and energy of a signal, methods to compute convolution, analytic signal and applications. *
Waveform and complex

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equivalent baseband simulation models. * Digital modulation techniques covered: BPSK and its variants, QPSK and its variants, M-ary PSK, M-ary QAM, M-ary PAM, CPM, MSK, GMSK, M-ary FSK. * Monte Carlo simulation for ascertaining performance of digital modulation techniques in AWGN and fading channels - E_b/N_0 Vs BER curves. * Design and implementation of linear equalizers - zero forcing and MMSE equalizers, using them in a communication link. * Simulation and performance

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of modulation systems with receiver impairments.

This cutting-edge, first-of-its-kind resource gives you a comprehensive understanding of the simulation and evaluation methods used for today's mobile communication systems. Written by two highly regarded experts in the field, the book focuses on the performance of both the physical and protocol layer transmission scheme. It defines and presents several invaluable simulation tools written in MATLAB® code, along with clear examples

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that explain their use.

This book discusses the latest channel coding techniques, MIMO systems, and 5G channel coding evolution. It provides a comprehensive overview of channel coding, covering modern techniques such as turbo codes, low-density parity-check (LDPC) codes, space-time coding, polar codes, LT codes, and Raptor codes as well as the traditional codes such as cyclic codes, BCH, RS codes, and convolutional codes. It also explores MIMO communications, which is an

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effective method for high-speed or high-reliability wireless communications. It also examines the evolution of 5G channel coding techniques. Each of the 13 chapters features numerous illustrative examples for easy understanding of the coding techniques, and MATLAB-based programs are integrated in the text to enhance readers' grasp of the underlying theories. Further, PC-based MATLAB m-files for illustrative examples are included for students and researchers involved in advanced and current

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concepts of coding theory. Designed to help teach and understand communication systems using a classroom-tested, active learning approach. Discusses communication concepts and algorithms, which are explained using simulation projects, accompanied by MATLAB and Simulink. Provides step-by-step code exercises and instructions to implement execution sequences. Includes a companion website that has MATLAB and Simulink model samples and templates. This volume presents an

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overview of computer-based simulation models and methodologies for communication systems. Topics covered include probability, random process, and estimation theory and roles in the design of computer-based simulations. Digital Signal Processing for Wireless Communication using Matlab Virtual Reality, Augmented Reality, Artificial Intelligence, Internet of Things, Robotics, Industry 4.0 Visible Light Communication System and Channel Modelling with MATLAB(R),

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Second Edition
System and Channel
Modelling with MATLAB®,
Second Edition
Fundamentals of Wireless
Communication

A comprehensive introduction to the fundamentals of design and applications of wireless communications. Wireless Communications Systems starts by explaining the fundamentals needed to understand, design, and deploy wireless communications systems. The author, a noted expert on the topic, explores the basic concepts of signals, modulation, antennas, and propagation with a MATLAB emphasis. The book

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emphasizes practical applications and concepts needed by wireless engineers. The author introduces applications of wireless communications and includes information on satellite communications, radio frequency identification, and offers an overview with practical insights into the topic of multiple input multiple output (MIMO). The book also explains the security and health effects of wireless systems concerns on users and designers. Designed as a practical resource, the text contains a range of examples and pictures that illustrate many different aspects of wireless

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technology. The book relies on MATLAB for most of the computations and graphics. This important text: Reviews the basic information needed to understand and design wireless communications systems Covers topics such as MIMO systems, adaptive antennas, direction finding, wireless security, internet of things (IoT), radio frequency identification (RFID), and software defined radio (SDR) Provides examples with a MATLAB emphasis to aid comprehension Includes an online solutions manual and video lectures on selected topics Written for students of engineering and physics and

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practicing engineers and scientists, *Wireless Communications Systems* covers the fundamentals of wireless engineering in a clear and concise manner and contains many illustrative examples.

An introduction to technical details related to the Physical Layer of the LTE standard with MATLAB® The LTE (Long Term Evolution) and LTE-Advanced are among the latest mobile communications standards, designed to realize the dream of a truly global, fast, all-IP-based, secure broadband mobile access technology. This book examines

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the Physical Layer (PHY) of the LTE standards by incorporating three conceptual elements: an overview of the theory behind key enabling technologies; a concise discussion regarding standard specifications; and the MATLAB® algorithms needed to simulate the standard. The use of MATLAB®, a widely used technical computing language, is one of the distinguishing features of this book. Through a series of MATLAB® programs, the author explores each of the enabling technologies, pedagogically synthesizes an LTE PHY system model, and evaluates system performance at each stage. Following this step-

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by-step process, readers will achieve deeper understanding of LTE concepts and specifications through simulations. Key Features:

- Accessible, intuitive, and progressive; one of the few books to focus primarily on the modeling, simulation, and implementation of the LTE PHY standard
- Includes case studies and testbenches in MATLAB®, which build knowledge gradually and incrementally until a functional specification for the LTE PHY is attained
- Accompanying Web site includes all MATLAB® programs, together with PowerPoint slides and other illustrative examples

Dr Houman

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Zarrinkoub has served as a development manager and now as a senior product manager with MathWorks, based in Massachusetts, USA. Within his 12 years at MathWorks, he has been responsible for multiple signal processing and communications software tools. Prior to MathWorks, he was a research scientist in the Wireless Group at Nortel Networks, where he contributed to multiple standardization projects for 3G mobile technologies. He has been awarded multiple patents on topics related to computer simulations. He holds a BSc degree in Electrical Engineering from McGill

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University and MSc and PhD
degrees in

Telecommunications from the
Institut Nationale de la
Recherche Scientifique,

in Canada. www.wiley.com/go/zarrinkoub

5G Physical Layer: Principles,
Models and Technology

Components explains

fundamental physical layer

design principles, models and

components for the 5G new radio

access technology – 5G New

Radio (NR). The physical layer

models include radio wave

propagation and hardware

impairments for the full range of

frequencies considered for the

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5G NR (up to 100 GHz). The physical layer technologies include flexible multi-carrier waveforms, advanced multi-antenna solutions, and channel coding schemes for a wide range of services, deployments, and frequencies envisioned for 5G and beyond. A MATLAB-based link level simulator is included to explore various design options. 5G Physical Layer is very suitable for wireless system designers and researchers: basic understanding of communication theory and signal processing is assumed, but familiarity with 4G and 5G standards is not required. With this book the reader will learn: The

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fundamentals of the 5G NR physical layer (waveform, modulation, numerology, channel codes, and multi-antenna schemes). Why certain PHY technologies have been adopted for the 5G NR. The fundamental physical limitations imposed by radio wave propagation and hardware impairments. How the fundamental 5G NR physical layer functionalities (e.g., parameters/methods/schemes) should be realized. The content includes: A global view of 5G development – concept, standardization, spectrum allocation, use cases and requirements, trials, and future

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commercial deployments. The fundamentals behind the 5G NR physical layer specification in 3GPP. Radio wave propagation and channel modeling for 5G and beyond. Modeling of hardware impairments for future base stations and devices. Flexible multi-carrier waveforms, multi-antenna solutions, and channel coding schemes for 5G and beyond. A simulator including hardware impairments, radio propagation, and various waveforms. Ali Zaidi is a strategic product manager at Ericsson, Sweden. Fredrik Athley is a senior researcher at Ericsson, Sweden. Jonas Medbo and Ulf Gustavsson are senior

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specialists at Ericsson, Sweden. Xiaoming Chen is a professor at Xi'an Jiaotong University, China. Giuseppe Durisi is a professor at Chalmers University of Technology, Sweden, and a guest researcher at Ericsson, Sweden.

Optimal Networked Control Systems with MATLAB® discusses optimal controller design in discrete time for networked control systems (NCS). The authors apply several powerful modern control techniques in discrete time to the design of intelligent controllers for such NCS. Detailed derivations, rigorous stability proofs, computer simulation

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examples, and downloadable MATLAB® codes are included for each case. The book begins by providing background on NCS, networked imperfections, dynamical systems, stability theory, and stochastic optimal adaptive controllers in discrete time for linear and nonlinear systems. It lays the foundation for reinforcement learning-based optimal adaptive controller use for finite and infinite horizons. The text then: Introduces quantization effects for linear and nonlinear NCS, describing the design of stochastic adaptive controllers for a class of linear and nonlinear systems Presents two-player zero-sum game-

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theoretic formulation for linear systems in input-output form enclosed by a communication network Addresses the stochastic optimal control of nonlinear NCS by using neuro dynamic programming Explores stochastic optimal design for nonlinear two-player zero-sum games under communication constraints Treats an event-sampled distributed NCS to minimize transmission of state and control signals within the feedback loop via the communication network Covers distributed joint optimal network scheduling and control design for wireless NCS, as well as the effect of network protocols on

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the wireless NCS controller design An ideal reference for graduate students, university researchers, and practicing engineers, Optimal Networked Control Systems with MATLAB® instills a solid understanding of neural network controllers and how to build them.

Discover the basic telecommunications systems principles in an accessible learn-by-doing format Communication Systems Principles Using MATLAB covers a variety of systems principles in telecommunications in an accessible format without the need to master a large body of theory. The text puts the focus

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on topics such as radio and wireless modulation, reception and transmission, wired networks and fiber optic communications. The book also explores packet networks and TCP/IP as well as digital source and channel coding, and the fundamentals of data encryption. Since MATLAB® is widely used by telecommunications engineers, it was chosen as the vehicle to demonstrate many of the basic ideas, with code examples presented in every chapter. The text addresses digital communications with coverage of packet-switched networks. Many fundamental concepts such as routing via

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shortest-path are introduced with simple and concrete examples. The treatment of advanced telecommunications topics extends to OFDM for wireless modulation, and public-key exchange algorithms for data encryption. Throughout the book, the author puts the emphasis on understanding rather than memorization. The text also: Includes many useful take-home skills that can be honed while studying each aspect of telecommunications Offers a coding and experimentation approach with many real-world examples provided Gives information on the underlying theory in order to

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better understand conceptual developments Suggests a valuable learn-by-doing approach to the topic Written for students of telecommunications engineering, Communication Systems Principles Using MATLAB® is the hands-on resource for mastering the basic concepts of telecommunications in a learn-by-doing format.

A New Perspective

Optical Fiber Communications
Systems

Radar Signal Analysis and
Processing Using MATLAB

Modelling the Wireless
Propagation Channel

Second Edition (Black & White
Print)

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A simulation approach with
MATLAB

Offering radar-related software for the analysis and design of radar waveform and signal processing, Radar Signal Analysis and Processing Using MATLAB® provides a comprehensive source of theoretical and practical information on radar signals, signal analysis, and radar signal processing with companion MATLAB® code. After an overview of radar systems operation and design, the book reviews elements of signal theory relevant to radar detection and radar signal processing, along with random variables and processes. The author

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then presents the unique characteristic of the matched filter and develops a general formula for the output of the matched filter that is valid for any waveform. He analyzes several analog waveforms, including the linear frequency modulation pulse and stepped frequency waveforms, as well as unmodulated pulse-train, binary, polyphase, and frequency codes. The book explores radar target detection and pulse integration, emphasizing the constant false alarm rate. It also covers the stretch processor, the moving target indicator, radar Doppler processing, beamforming, and adaptive array processing. Using configurable MATLAB code,

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this book demonstrates how to apply signal processing to radar applications. It includes many examples and problems to illustrate the practical application of the theory.

*MIMO-OFDM Wireless
Communications with MATLAB* John
Wiley & Sons

The field of visible light communication (VLC) has diverse applications to the end user including streaming audio, video, high-speed data browsing, voice over internet and online gaming. This comprehensive textbook discusses fundamental aspects, research activities and modulation techniques in the field of VLC.

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Visible Light Communication: A Comprehensive Theory and Applications with MATLAB® discusses topics including line of sight (LOS) propagation model, non-line of sight (NLOS) propagation model, carrier less amplitude and phase modulation, multiple-input-multiple-output (MIMO), non-linearities of optical sources, orthogonal frequency-division multiple access, non-orthogonal multiple access and single-carrier frequency-division multiple access in depth. Primarily written for senior undergraduate and graduate students in the field of electronics and communication engineering for courses on optical wireless

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*communication and VLC, this book:
Provides up-to-date literature in the
field of VLC Presents MATLAB
codes and simulations to help
readers understand simulations
Discusses applications of VLC in
enabling vehicle to vehicle (V2V)
communication Covers topics
including radio frequency (RF)
based wireless communications and
VLC Presents modulation formats
along with the derivations of
probability of error expressions
pertaining to different variants of
optical OFDM
Detailing a systems approach,
Optical Wireless Communications:
System and Channel Modelling with
MATLAB®, is a self-contained*

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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

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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

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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 textbook provides engineering students with instruction on processing signals encountered in speech, music, and wireless communications using software or hardware by employing basic

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mathematical methods. The book starts with an overview of signal processing, introducing readers to the field. It goes on to give instruction in converting continuous time signals into digital signals and discusses various methods to process the digital signals, such as filtering. The author uses MATLAB throughout as a user-friendly software tool to perform various digital signal processing algorithms and to simulate real-time systems. Readers learn how to convert analog signals into digital signals; how to process these signals using software or hardware; and how to write algorithms to perform useful operations on the acquired signals

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such as filtering, detecting digitally modulated signals, correcting channel distortions, etc. Students are also shown how to convert MATLAB codes into firmware codes. Further, students will be able to apply the basic digital signal processing techniques in their workplace. The book is based on the author's popular online course at University of California, San Diego.

Channel Coding Techniques for Wireless Communications

Introduction to Communication Systems

Software-Defined Radio for Engineers

Optimal Networked Control Systems with MATLAB

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Paper

*Smart Antennas for Wireless
Communications*

With MATLAB

*The 2nd Edition of Optical
Wireless Communications:
System and Channel
Modelling with MATLAB®
with additional new
materials, is a self-
contained volume that
provides a concise and
comprehensive coverage of
the theory and technology
of optical wireless
communication systems
(OWC). The delivery method
makes the book appropriate
for students studying at
undergraduate and graduate
levels as well as*

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researchers and professional engineers working in the field of OWC. The book gives a detailed description of OWC, focusing mainly on the infrared and visible bands, for indoor and outdoor applications. A major attraction of the book is the inclusion of Matlab codes and simulations results as well as experimental test-beds for free space optics and visible light communication systems. This valuable resource will aid the readers in understanding the concept,

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carrying out extensive analysis, simulations, implementation and evaluation of OWC links. This 2nd edition is structured into nine compact chapters that cover the main aspects of OWC systems: History, current state of the art and challenges Fundamental principles Optical source and detector and noise sources Modulation, equalization, diversity techniques Channel models and system performance analysis Visible light communications Terrestrial free space optics

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*communications Relay-based
free space optics
communications Matlab
codes. A number of Matlab
based simulation codes are
included in this 2nd
edition to assist the
readers in mastering the
subject and most
importantly to encourage
them to write their own
simulation codes and
enhance their knowledge.
* A learner-friendly,
practical and example
driven book, Wireless
Communication Systems in
Matlab gives you a solid
background in building
simulation models for*

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wireless systems in Matlab. This book, an essential guide for understanding the basic implementation aspects of a wireless system, shows how to simulate and model such a system from scratch. The implemented simulation models shown in this book, provide an opportunity for an engineer to understand the basic implementation aspects of modeling various building blocks of a wireless communication system. It presents the following key topics with the required theoretical

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background, along with the implementation details in the form of Matlab scripts. * Random variables for simulating probabilistic systems and applications like Jakes filter design and colored noise generation. * Models for Shannon's channel capacity, unconstrained awgn channel, binary symmetric channel (BSC), binary erasure channel (BEC), constellation constrained capacities and ergodic capacity over fading channel. The theory of linear block codes, decoding techniques using

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*soft-decisions and hard-decisions, and their performance simulations. * Monte Carlo simulation for ascertaining performance of digital modulation techniques in AWGN and fading channels - Eb/N0 Vs BER curves. Pulse shaping techniques, matched filtering and partial response signaling, Design and implementation of linear equalizers - zero forcing and MMSE equalizers, using them in a communication link and modulation systems with receiver impairments. * Large-scale propagation*

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models like Friis free space model, log distance model, two ray ground reflection model, single knife-edge diffraction model, Hata Okumura model.

** Essentials of small-scale propagation models for wireless channels, such as, power delay profile, Doppler power spectrum, Rayleigh and Rice processes. Modeling flat fading and frequency selective channels. **

Diversity techniques for multiple antenna systems: Alamouti space-time coding, maximum ratio combining, equal gain

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combining and selection combining. * Simulation models for direct sequence spread spectrum, frequency hopping spread spectrum and OFDM.

The 2nd Edition of *Optical Wireless Communications: System and Channel Modelling with MATLAB®* with additional new materials, is a self-contained volume that provides a concise and comprehensive coverage of the theory and technology of optical wireless communication systems (OWC). The delivery method makes the book appropriate for

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students studying at undergraduate and graduate levels as well as researchers and professional engineers working in the field of OWC. The book gives a detailed description of OWC, focusing mainly on the infrared and visible bands, for indoor and outdoor applications. A major attraction of the book is the inclusion of Matlab codes and simulations results as well as experimental test-beds for free space optics and visible light communication systems.

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This valuable resource will aid the readers in understanding the concept, carrying out extensive analysis, simulations, implementation and evaluation of OWC links. This 2nd edition is structured into nine compact chapters that cover the main aspects of OWC systems: History, current state of the art and challenges Fundamental principles Optical source and detector and noise sources Modulation, equalization, diversity techniques Channel models and system performance

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*analysis Visible light
communications Terrestrial
free space optics
communications Relay-based
free space optics
communications Matlab
codes. A number of Matlab
based simulation codes are
included in this
2nd edition to assist the
readers in mastering the
subject and most
importantly to encourage
them to write their own
simulation codes and
enhance their knowledge. ,
implementation and
evaluation of OWC links.
This 2nd edition is
structured into nine*

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compact chapters that cover the main aspects of OWC systems: History, current state of the art and challenges Fundamental principles Optical source and detector and noise sources Modulation, equalization, diversity techniques Channel models and system performance analysis Visible light communications Terrestrial free space optics communications Relay-based free space optics communications Matlab codes. A number of Matlab based simulation codes are included in this

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2nd edition to assist the readers in mastering the subject and most importantly to encourage them to write their own simulation codes and enhance their knowledge. lab codes. A number of Matlab based simulation codes are included in this 2nd edition to assist the readers in mastering the subject and most importantly to encourage them to write their own simulation codes and enhance their knowledge. Orthogonal Frequency Division Multiplexing (OFDM) systems are widely

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used in the standards for digital audio/video broadcasting, WiFi and WiMax. Being a frequency-domain approach to communications, OFDM has important advantages in dealing with the frequency-selective nature of high data rate wireless communication channels. As the needs for operating with higher data rates become more pressing, OFDM systems have emerged as an effective physical-layer solution. This short monograph is intended as a tutorial which highlights the deleterious aspects of

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the wireless channel and presents why OFDM is a good choice as a modulation that can transmit at high data rates. The system-level approach we shall pursue will also point out the disadvantages of OFDM systems especially in the context of peak to average ratio, and carrier frequency synchronization. Finally, simulation of OFDM systems will be given due prominence. Simple MATLAB programs are provided for bit error rate simulation using a discrete-time OFDM

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representation. Software is also provided to simulate the effects of inter-block-interference, inter-carrier-interference and signal clipping on the error rate performance. Different components of the OFDM system are described, and detailed implementation notes are provided for the programs. The program can be downloaded here. Table of Contents: Introduction / Modeling Wireless Channels / Baseband OFDM System / Carrier Frequency Offset / Peak to Average Power Ratio / Simulation of the

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*Performance of OFDM
Systems / Conclusions
An accessible,
comprehensive and coherent
treatment of MIMO
communication, drawing on
ideas from information
theory and signal
processing.*

*Optical Wireless
Communications
Practical Channel-Aware
Resource Allocation
Principles of
Communication Systems
Simulation with Wireless
Applications
Wireless Communications
and Networking
MIMO-OFDM Wireless*

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*Communications with MATLAB
Foundations of MIMO
Communication*

A practical tool for propagation channel modeling with MATLAB® simulations. Many books on wireless propagation channel provide a highly theoretical coverage, which for some interested readers, may be difficult to follow. This book takes a very practical approach by introducing the theory in each chapter first, and then carrying out simulations showing how exactly put the theory into practice. The resulting plots are analyzed and commented for clarity, and conclusions are drawn and explained from

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the obtained results. Key features include: A unique approach to propagation channel modeling with accompanying MATLAB® simulations to demonstrate the theory in practice Contains step by step commentary and analysis of the obtained simulation results in order to provide a comprehensive and structured learning tool Covers a wide range of topics including shadowing effects, coverage and interference, Multipath Narrowband channel, Multipath Wideband channel, propagation in micro and pico-cells, the land mobile satellite (LMS) channel, the directional

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Multipath channel and MIMO and propagation effects in fixed radio links (terrestrial and satellite) The book comes with an accompanying website that contains the MATLAB® simulations and allows readers to try them out themselves Well suited for lab-use, as reference and as a self-learning tool both for advanced students and professionals Modeling the Wireless Propagation Channel: A simulation approach with MATLAB® will be best suited for postgraduate (Masters and PhD) students and practicing engineers in telecommunications and electrical engineering fields,

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who are seeking to familiarise themselves with the topic without too many formulas. The book will also be of interest to network engineers, system engineers and researchers

Digital Communication using MATLAB and Simulink is intended for a broad audience. For the student taking a traditional course, the text provides simulations of the MATLAB and Simulink systems, and the opportunity to go beyond the lecture or laboratory and develop investigations and projects. For the professional, the text facilitates an expansive review of and experience with the tenets of digital

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communication systems. Designed to help teach and understand communication systems using a classroom-tested, active learning approach. Discusses communication concepts and algorithms, which are explained using simulation projects, accompanied by MATLAB and Simulink Provides step-by-step code exercises and instructions to implement execution sequences Includes a companion website that has MATLAB and Simulink model samples and templates (password: matlab) This book examines signal processing techniques used in wireless communication

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illustrated by using the Matlab program. The author discusses these techniques as they relate to Doppler spread, Delay spread, Rayleigh and Rician channel modeling, rake receiver, diversity techniques, MIMO and OFDM based transmission techniques, and array signal processing. Related topics such as detection theory, Link budget, Multiple access techniques, spread spectrum, are also covered. • Illustrates signal processing techniques involved in wireless communication • Discusses multiple access techniques such as Frequency division multiple access, Time division multiple access, and Code

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**division multiple access •
Covers band pass modulation
techniques such as Binary
phase shift keying,
Differential phase shift
keying, Quadrature phase
shift keying, Binary frequency
shift keying, Minimum shift
keying, and Gaussian
minimum shift keying.
This book dives into radio
resource allocation
optimizations, a research area
for wireless communications,
in a pragmatic way and not
only includes wireless channel
conditions but also
incorporates the channel in a
simple and practical fashion
via well-understood
equations. Most importantly,
the book presents a practical**

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perspective by modeling channel conditions using terrain-aware propagation which narrows the gap between purely theoretical work and that of industry methods. The provided propagation modeling reflects industry grade scenarios for radio environment map and hence makes the channel based resource allocation presented in the book a field-grade view. Also, the book provides large scale simulations that account for realistic locations with terrain conditions that can produce realistic scenarios applicable in the field. Most portions of the book are accompanied with MATLAB code and

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occasionally

MATLAB/Python/C code. The book is intended for graduate students, academics, researchers of resource allocation in mathematics, computer science, and electrical engineering departments as well as working professionals/engineers in wireless industry.

Practical Guide to MIMO Radio Channel

Communication Systems

Principles Using MATLAB

Comprehensive Theory and

Applications with MATLAB®

Contemporary Communication

Systems Using MATLAB

With MATLAB and Python

Code

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**Understanding LTE with
MATLAB
Quickly Engages in
Applying Algorithmic
Techniques to Solve
Practical Signal
Processing Problems With
its active, hands-on
learning approach, this
text enables readers to
master the underlying
principles of digital signal
processing and its many
applications in industries
such as digital television,
mobile and broadband
communications, and
medical/scientific
devices. Carefully**

developed MATLAB® examples throughout the text illustrate the mathematical concepts and use of digital signal processing algorithms. Readers will develop a deeper understanding of how to apply the algorithms by manipulating the codes in the examples to see their effect. Moreover, plenty of exercises help to put knowledge into practice solving real-world signal processing challenges. Following an introductory chapter, the text

explores: Sampled signals and digital processing Random signals Representing signals and systems Temporal and spatial signal processing Frequency analysis of signals Discrete-time filters and recursive filters Each chapter begins with chapter objectives and an introduction. A summary at the end of each chapter ensures that one has mastered all the key concepts and techniques before progressing in the

text. Lastly, appendices listing selected web resources, research papers, and related textbooks enable the investigation of individual topics in greater depth. Upon completion of this text, readers will understand how to apply key algorithmic techniques to address practical signal processing problems as well as develop their own signal processing algorithms. Moreover, the text provides a solid foundation for evaluating

and applying new digital processing signal techniques as they are developed.

An accessible undergraduate textbook introducing key fundamental principles behind modern communication systems, supported by exercises, software problems and lab exercises.

Focusing on the fundamentals of wireless communications and networking, this book introduces readers to an overview of the salient

features of first and second generation wireless cellular systems, and those perceived for the third generation, with a road map. It identifies the problems that cause information loss in point-to-point signal transmission through the wireless channel, and discusses techniques suitable for minimizing the information loss. With an acceptable transmission quality, the text proceeds to cover wireless communications in a cellular setting,

***treating the ramifications
in terms of capacity
maximization, support for
multi-user transmissions,
mobility management to
facilitate user roaming,
and global information
delivery through
wireless/wireline
interworking. For
individuals beginning
their study of electrical
and computer
engineering.
Optimal Resource
Allocation in Coordinated
Multi-Cell Systems
provides a solid
grounding and***

understanding for optimization of practical multi-cell systems and will be of interest to all researchers and engineers working on the practical design of such systems.

This is probably the first book that employs the technique of simulation experiments as a means of reinforcing the basic concepts of communication theory. Undergraduate students are generally exposed to a mathematically rigorous treatment of

communications theory but seldom have the benefit of a practical-orientated approach employing modelling and simulation for a thorough assimilation of the subject. This book can supplement any standard textbook to cover this significant lacuna in the existing learning methodology. It uses MATLAB®, the language of the technical computing fraternity, for the purpose. The introductory chapters provide an overview of

**computer simulation and
MATLAB programming
concepts. Thereafter,
communications concepts
are presented in the
traditional manner but
followed up with
appropriate simulations
in MATLAB/Simulink®.
Relevant MATLAB source
code is given whenever it
is used to illustrate a
point. All the source code
given in the text has
been tested on MATLAB
kernel version 7.10
(Release R2010a) and is
provided in the
accompanying CD.**

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***Simulation and Software
Radio for Mobile
Communications
Optimal Resource
Allocation in Coordinated
Multi-Cell Systems
Digital Modulations Using
Matlab
Wireless Communication
Systems in Matlab
Wireless Communications
Systems
From Mathematical
Modeling to Simulation
and Prototyping***

*This textbook takes a
unified view of the
fundamentals of wireless
communication and explains*

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cutting-edge concepts in a simple and intuitive way. An abundant supply of exercises make it ideal for graduate courses in electrical and computer engineering and it will also be of great interest to practising engineers. Smart antennas boost the power of a wireless network, saving energy and money and greatly increasing the range of wireless broadband. Smart Antennas is a rigorous textbook on smart antenna design and deployment. Detailing the advantages and limitations of multi-

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carrier communication, this book proposes possible solutions for these limitations. Multi-Carrier Communication Systems with Examples in MATLAB®: A New Perspective addresses the two primary drawbacks of orthogonal frequency division multiplexing (OFDM) communication systems: the high sensitivity to carrier frequency offsets and phase noise, and the high peak-to-average power ratio (PAPR) of the transmitted signals. Presenting a new interleaving scheme for

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multicarrier

communication, the book starts with a detailed overview of multi-carrier systems such as OFDM, multi-carrier code division multiple access (MC-CDMA), and single-carrier frequency division multiple access (SC-FDMA) systems. From there, it proposes a new way to deal with the frequency-selective fading channel: the single-carrier with frequency domain equalization (SC-FDE) scheme. The second part of the book examines the performance of the

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continuous phase modulation (CPM)-based OFDM (CPM-OFDM) system. It proposes a CPM-based single-carrier frequency domain equalization (CPM-SC-FDE) structure for broadband wireless communication systems. In the third part of the book, the author proposes a chaotic interleaving scheme for both CPM-OFDM and the CPM-SC-FDE systems. A comparison between the proposed chaotic interleaving and the conventional block interleaving is also performed in this part.

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The final part of the book presents efficient image transmission techniques over multi-carrier systems such as OFDM, MC-CDMA, and SC-FDMA. It details a new approach for efficient image transmission over OFDM and MC-CDMA systems using chaotic interleaving that transmits images over wireless channels efficiently. The book studies the performance of discrete cosine transform-based single-carrier frequency division multiple access (DCT-SC-FDMA) with image transmission. It also

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proposes a CPM-based DCT-SC-FDMA structure for efficient image transmission. The book includes MATLAB® simulations along with MATLAB code so you can practice carrying out your own extensive simulations. Featuring a variety of applications that motivate students, this book serves as a companion or supplement to any of the comprehensive textbooks in communication systems. The book provides a variety of exercises that may be solved on the computer using MATLAB. By design,

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the treatment of the various topics is brief. The authors provide the motivation and a short introduction to each topic, establish the necessary notation, and then illustrate the basic concepts by means of an example. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version. MIMO-OFDM is a key technology for next-generation cellular communications (3GPP-LTE, Mobile WiMAX, IMT-

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Advanced) as well as wireless LAN (IEEE 802.11a, IEEE 802.11n), wireless PAN (MB-OFDM), and broadcasting (DAB, DVB, DMB). In MIMO-OFDM Wireless Communications with MATLAB®, the authors provide a comprehensive introduction to the theory and practice of wireless channel modeling, OFDM, and MIMO, using MATLAB® programs to simulate the various techniques on MIMO-OFDM systems. One of the only books in the area dedicated to explaining simulation aspects Covers implementation to help

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*cement the key concepts
Uses materials that have
been classroom-tested in
numerous universities
Provides the analytic
solutions and practical
examples with downloadable
MATLAB® codes Simulation
examples based on actual
industry and research
projects Presentation
slides with key equations
and figures for instructor
use MIMO-OFDM Wireless
Communications with
MATLAB® is a key text for
graduate students in
wireless communications.
Professionals and
technicians in wireless*

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*communication fields,
graduate students in
signal processing, as well
as senior undergraduates
majoring in wireless
communications will find
this book a practical
introduction to the MIMO-
OFDM techniques.*

*Instructor materials and
MATLAB® code examples
available for download at
www.wiley.com/go/chomimo*

*Build Simulation Models
from Scratch*

An Introduction

*Theory and Practice with
MATLAB® and Simulink®
Models*

Principles, Models and

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Technology Components System and Channel Modelling with MATLAB® Modeling of Digital Communication Systems Using SIMULINK

A comprehensive and detailed treatment of the program SIMULINK® that focuses on SIMULINK® for simulations in Digital and Wireless Communications Modeling of Digital Communication Systems Using SIMULINK® introduces the reader to SIMULINK®, an extension of the widely-used MATLAB modeling tool, and the use of SIMULINK® in modeling and simulating digital communication systems, including wireless communication systems. Readers will learn to model a wide selection of digital communications

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techniques and evaluate their performance for many important channel conditions. Modeling of Digital Communication Systems Using SIMULINK® is organized in two parts. The first addresses Simulink® models of digital communications systems using various modulation, coding, channel conditions and receiver processing techniques. The second part provides a collection of examples, including speech coding, interference cancellation, spread spectrum, adaptive signal processing, Kalman filtering and modulation and coding techniques currently implemented in mobile wireless systems. Covers case examples, progressing from basic to complex Provides applications for mobile communications, satellite communications, and fixed wireless systems that reveal the power of

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SIMULINK modeling Includes access to useable SIMULINK® simulations online All models in the text have been updated to R2018a; only problem sets require updating to the latest release by the user Covering both the use of SIMULINK® in digital communications and the complex aspects of wireless communication systems, Modeling of Digital Communication Systems Using SIMULINK® is a great resource for both practicing engineers and students with MATLAB experience. with MATLAB Examples Digital Signal Processing Using MATLAB for Students and Researchers 5G Physical Layer Communication Systems Modeling and Simulation using MATLAB and Simulink

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Paper

Multi-Carrier Communication Systems
with Examples in MATLAB®
Introduction to Digital Signal
Processing Using MATLAB with
Application to Digital Communications