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Intuitive Probability and Random Processes using MATLAB® is an introduction to probability and random processes that merges theory with practice. Based on the author's belief that only "hands-on" experience with the material can promote intuitive understanding, the approach is to motivate the need for theory using MATLAB examples, followed by theory and analysis, and finally descriptions of "real-world" examples to acquaint the reader with a wide variety of applications. The latter is intended to answer the usual question "Why do we have to study this?" Other salient features are: *heavy reliance on computer simulation for illustration and student exercises *the incorporation of MATLAB programs and code segments *discussion of discrete random variables followed by continuous random variables to minimize confusion *summary sections at the beginning of each chapter *in-line equation explanations *warnings on common errors and pitfalls *over 750 problems designed to help the reader assimilate and extend the concepts Intuitive Probability and Random Processes using MATLAB® is intended for undergraduate and first-year graduate students in engineering. The practicing engineer as well as others having the appropriate mathematical background will also benefit from this book. About the Author Steven M. Kay is a Professor of Electrical Engineering at the University of Rhode Island and a leading expert in signal processing. He has received the Education Award "for outstanding contributions in education and in writing scholarly books and texts..." from the IEEE Signal Processing society and has been listed as among the 250 most cited researchers in the world in engineering.

Most books on the wireless propagation channel have a rather theoretical approach, which for

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some interested readers, may not be easy to follow. The approach proposed here is based on carrying out simulations after a brief introduction to the theoretical fundamentals of the issues dealt with in each chapter.

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 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-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 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

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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 University and MSc and PhD degrees in Telecommunications from the Institut Nationale de la Recherche Scientifique, in Canada.

<http://www.wiley.com/go/zarrinkoub> www.wiley.com/go/zarrinkoub/a

This book is intended to help researchers overcome the entrance barrier to Proper Generalized Decomposition (PGD), by providing a valuable tool to begin the programming task. Detailed Matlab Codes are included for every chapter in the book, in which the theory previously described is translated into practice. Examples include parametric problems, non-linear model order reduction and real-time simulation, among others. Proper Generalized Decomposition (PGD) is a method for numerical simulation in many fields of applied science and engineering. As a generalization of Proper Orthogonal Decomposition or Principal Component Analysis to an arbitrary number of dimensions, PGD is able to provide the analyst with very accurate solutions for problems defined in high dimensional spaces, parametric problems and even real-time simulation.

Presents advanced reservoir simulation methods used in the widely-used MRST open-source software for researchers, professionals, students.

This textbook explores both the theoretical foundation of the Finite Volume Method (FVM) and its applications in Computational Fluid Dynamics (CFD). Readers will discover a thorough explanation of the FVM numerics and algorithms used for the simulation of incompressible and

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compressible fluid flows, along with a detailed examination of the components needed for the development of a collocated unstructured pressure-based CFD solver. Two particular CFD codes are explored. The first is uFVM, a three-dimensional unstructured pressure-based finite volume academic CFD code, implemented within Matlab. The second is OpenFOAM®, an open source framework used in the development of a range of CFD programs for the simulation of industrial scale flow problems. With over 220 figures, numerous examples and more than one hundred exercise on FVM numerics, programming, and applications, this textbook is suitable for use in an introductory course on the FVM, in an advanced course on numerics, and as a reference for CFD programmers and researchers.

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 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-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

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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 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 University and MSc and PhD degrees in Telecommunications from the Institut Nationale de la Recherche Scientifique, in Canada. www.wiley.com/go/zarrinkoub

Although, the basic concept of a fuel cell is quite simple, creating new designs and optimizing their performance takes serious work and a mastery of several technical areas. PEM Fuel Cell Modeling and Simulation Using Matlab, provides design engineers and researchers with a valuable tool for understanding and overcoming barriers to designing and building the next generation of PEM Fuel Cells. With this book, engineers can test components and verify designs in the development phase, saving both time and money. Easy to read and understand, this book provides design and modelling tips for fuel cell components such as: modelling proton exchange structure, catalyst layers, gas diffusion, fuel distribution structures, fuel cell stacks and fuel cell plant. This book includes design advice and MATLAB and FEMLAB codes for Fuel Cell types such as: polymer electrolyte, direct methanol and solid oxide fuel cells. This

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book also includes types for one, two and three dimensional modeling and two-phase flow phenomena and microfluidics. *Modeling and design validation techniques *Covers most types of Fuel Cell including SOFC *MATLAB and FEMLAB modelling codes *Translates basic phenomena into mathematical equations

The subject matter of this book is to present the procedural steps required for modeling and simulating the basic dynamic system problems in SIMULINK (a supplementary part of MATLAB) which follow some definitive model. However, the key features of the text can be cited as follows: The book is on the whole a guiding tool for the undergraduate and graduate students of science and engineering who want to work out or simulate the classroom modeling problems using SIMULINK To check the understanding of SIMULINK output and deliberate the reliability on SIMULINK, analytical solutions of the model outputs are inserted in most chapters Since the text presents modeling ranging from elementary to advanced level, audience spectrum of the text includes engineers, teachers, researchers, and scientists who are beginners in using SIMULINK Know-how aspects of SIMULINK are covered in a made-easy way so that the average reader becomes benefited even if starting from the scratch Tabular block links at the end of each chapter required for a particular class of problems help the reader bring them in the model file and simulate quickly Over 300 classroom-

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modeling examples are simulated with clarity and systematic steps Appropriate for individual or classroom exercise There are ten chapters in the book bearing the following titles: Introduction to SIMULINK Modeling Mathematical Functions and Waves Modeling Ordinary Differential Equations Modeling Difference Equations Modeling Common Problems of Control Systems Modeling Some Signal Processing Problems Modeling Common Matrix Algebra Problems Modeling Common Statistics and Conversion Problems Fourier Analysis Problems Miscellaneous Modeling and Some Programming Issues “Data-Driven Modeling: Using MATLAB® in Water Resources and Environmental Engineering” provides a systematic account of major concepts and methodologies for data-driven models and presents a unified framework that makes the subject more accessible to and applicable for researchers and practitioners. It integrates important theories and applications of data-driven models and uses them to deal with a wide range of problems in the field of water resources and environmental engineering such as hydrological forecasting, flood analysis, water quality monitoring, regionalizing climatic data, and general function approximation. The book presents the statistical-based models including basic statistical analysis, nonparametric and logistic regression methods, time series analysis and modeling, and support vector machines. It also deals with the

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analysis and modeling based on artificial intelligence techniques including static and dynamic neural networks, statistical neural networks, fuzzy inference systems, and fuzzy regression. The book also discusses hybrid models as well as multi-model data fusion to wrap up the covered models and techniques. The source files of relatively simple and advanced programs demonstrating how to use the models are presented together with practical advice on how to best apply them. The programs, which have been developed using the MATLAB® unified platform, can be found on extras.springer.com. The main audience of this book includes graduate students in water resources engineering, environmental engineering, agricultural engineering, and natural resources engineering. This book may be adapted for use as a senior undergraduate and graduate textbook by focusing on selected topics. Alternatively, it may also be used as a valuable resource book for practicing engineers, consulting engineers, scientists and others involved in water resources and environmental engineering.

An introduction to the theory and practice of financial simulation and optimization
In recent years, there has been a notable increase in the use of simulation and optimization methods in the financial industry. Applications include portfolio allocation, risk management, pricing, and capital budgeting under uncertainty. This accessible guide provides an introduction to the simulation and optimization

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techniques most widely used in finance, while at the same time offering background on the financial concepts in these applications. In addition, it clarifies difficult concepts in traditional models of uncertainty in finance, and teaches you how to build models with software. It does this by reviewing current simulation and optimization methodology-along with available software-and proceeds with portfolio risk management, modeling of random processes, pricing of financial derivatives, and real options applications. Contains a unique combination of finance theory and rigorous mathematical modeling emphasizing a hands-on approach through implementation with software Highlights not only classical applications, but also more recent developments, such as pricing of mortgage-backed securities Includes models and code in both spreadsheet-based software (@RISK, Solver, Evolver, VBA) and mathematical modeling software (MATLAB) Filled with in-depth insights and practical advice, Simulation and Optimization Modeling in Finance offers essential guidance on some of the most important topics in financial management.

Stochastic Simulation and Applications in Finance with MATLAB Programs explains the fundamentals of Monte Carlo simulation techniques, their use in the numerical resolution of stochastic differential equations and their current applications in finance. Building on an integrated approach, it provides a

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pedagogical treatment of the need-to-know materials in risk management and financial engineering. The book takes readers through the basic concepts, covering the most recent research and problems in the area, including: the quadratic re-sampling technique, the Least Squared Method, the dynamic programming and Stratified State Aggregation technique to price American options, the extreme value simulation technique to price exotic options and the retrieval of volatility method to estimate Greeks. The authors also present modern term structure of interest rate models and pricing swaptions with the BGM market model, and give a full explanation of corporate securities valuation and credit risk based on the structural approach of Merton. Case studies on financial guarantees illustrate how to implement the simulation techniques in pricing and hedging. NOTE TO READER: The CD has been converted to URL. Go to the following website www.wiley.com/go/huyhnstochastic which provides MATLAB programs for the practical examples and case studies, which will give the reader confidence in using and adapting specific ways to solve problems involving stochastic processes in finance.

With an emphasis on problem solving, this book introduces the basic principles and fundamental concepts of computational modeling. It emphasizes reasoning and conceptualizing problems, the elementary mathematical modeling, and the

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implementation using computing concepts and principles. Examples are included that demonstrate the computation and visualization of the implemented models. The author provides case studies, along with an overview of computational models and their development. The first part of the text presents the basic concepts of models and techniques for designing and implementing problem solutions. It applies standard pseudo-code constructs and flowcharts for designing models. The second part covers model implementation with basic programming constructs using MATLAB®, Octave, and FreeMat. Aimed at beginning students in computer science, mathematics, statistics, and engineering, *Introduction to Elementary Computational Modeling: Essential Concepts, Principles, and Problem Solving* focuses on fundamentals, helping the next generation of scientists and engineers hone their problem solving skills. The book introduces the principles of mathematical modeling in science, engineering, and social science as well as basic skills of computer programming. The book is aimed at majors in STEM disciplines that need to understand how to create, analyze, and test mathematical models.

Introduction to Modeling and Simulation with Matlab(r) and Python CRC Press
This book offers a comprehensive introduction to intelligent control system design, using MATLAB simulation to verify typical intelligent controller designs. It

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also uses real-world case studies that present the results of intelligent controller implementations to illustrate the successful application of the theory. Addressing the need for systematic design approaches to intelligent control system design using neural network and fuzzy-based techniques, the book introduces the concrete design method and MATLAB simulation of intelligent control strategies; offers a catalog of implementable intelligent control design methods for engineering applications; provides advanced intelligent controller design methods and their stability analysis methods; and presents a sample simulation and Matlab program for each intelligent control algorithm. The main topics addressed are expert control, fuzzy logic control, adaptive fuzzy control, neural network control, adaptive neural control and intelligent optimization algorithms, providing several engineering application examples for each method.

Presents numerical methods for reservoir simulation, with efficient implementation and examples using widely-used online open-source code, for researchers, professionals and advanced students. This title is also available as Open Access on Cambridge Core. Exploring roles critical to environmental toxicology, Modeling and Simulation in Ecotoxicology with Applications in MATLAB and Simulink covers the steps in modeling and simulation from problem conception to validation and simulation analysis. Using the MATLAB and Simulink programming languages, the book presents examples of

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mathematical functions a

Simulation is increasingly important for students in a wide variety of fields, from engineering and physical sciences to medicine, biology, economics, and applied mathematics. Current trends point toward interdisciplinary courses in simulation intended for all students regardless of their major, but most textbooks are subject-specific and consequently are not suitable for such a course. *Simulation of Dynamic Systems with MATLAB® and Simulink®* offers a unified introduction to continuous simulation that focuses on the common principles underlying the vast array of simulation models that describe very different phenomena. Written by accomplished expert Harold Klee, this text builds an in-depth and intuitive understanding of the basic concepts and mathematical tools that students can easily generalize to their own field of study. The author includes case studies, real-world examples, abundant homework problems, and thousands of equations to develop a practical understanding of the concepts. Moreover, he incorporates MATLAB® and Simulink® tools to help students gain experience with designing, implementing, and adjusting their simulations. This classroom-tested text works systematically through linear, continuous-time, and discrete-time dynamic systems as well as basic, intermediate, and advanced topics in numerical integration. Supplying downloadable MATLAB M-files and Simulink model files, *Simulation of Dynamic Systems with MATLAB® and Simulink®* is ideal for a one- or two-semester course in continuous simulation, offering valuable flexibility for

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instructors.

Introduction -- Fuel Cell Thermodynamics -- Fuel Cell Electrochemistry -- Fuel Cell Charge Transport -- Fuel Cell Mass Transport -- Fuel Cell Energy Balances -- Modeling the Proton Exchange Structure -- Modeling the Catalyst Layers -- Modeling the Gas Diffusion Layers -- Modeling the Fuel Distribution Structures -- Modeling Micro Fuel Cells -- Modeling Fuel Cell Stacks -- Modeling the Fuel Cell Plant -- Model Validation.

MATLAB: Easy Way of Learning, covers exactly what students need to know in an introductory course. This comprehensive book helps reader in understanding all the aspects of MATLAB basics and applications in an easy way. The authors explain concepts by balanced treatment of theoretical and practical concepts with easy-to-understand programming codes and executions. The book is suitable for the postgraduate and undergraduate students of engineering and sciences streams. This book offers a unified presentation that does not discriminate between atmospheric and space flight. It demonstrates that the two disciplines have evolved from the same set of physical principles and introduces a broad range of critical concepts in an accessible, yet mathematically rigorous presentation. The book presents many MATLAB and Simulink-based numerical examples and real-world simulations. Replete with illustrations, end-of-chapter exercises, and selected solutions, the work is primarily useful as a textbook for advanced undergraduate and beginning graduate-level students.

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Wiley introduces a new offering in dynamic systems—Dynamic Systems: Modeling, Simulation, and Control by Craig Kluever. This text highlights essential topics such as analysis, design, and control of physical engineering systems, often composed of interacting mechanical, electrical and fluid subsystem components. Dynamic Systems: Modeling, Simulation, and Control is intended for an introductory course in dynamic systems and control, and written for mechanical engineering and other engineering curricula. Major topics covered in this text include mathematical modeling, system-response analysis, and an introduction to feedback control systems. Dynamic Systems integrates an early introduction to numerical simulation using MATLAB®'s Simulink for integrated systems. Simulink® and MATLAB® tutorials for both software programs will also be provided. The author's text also has a strong emphasis on real-world case studies. Derived from top-tier engineering from the AMSE Journal of Dynamic Systems, Measurement, and Control, case studies are leveraged to demonstrate fundamental concepts as well as the analysis of complex engineering systems. In addition, Dynamic Systems delivers a wide variety of end of chapter problems, including conceptual problems, MATLAB® problems, and Engineering Application problems.

This introduction to dynamical systems theory guides readers through theory via example and the graphical MATLAB interface; the SIMULINK® accessory is used to simulate real-world dynamical processes. Examples included are from mechanics, electrical circuits, economics, population dynamics, epidemiology, nonlinear optics,

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materials science and neural networks. The book contains over 330 illustrations, 300 examples, and exercises with solutions.

This exciting new resource presents a comprehensive introduction to the fundamentals of diffraction of two-dimensional canonical structures, including wedge, strip, and triangular cylinder with different boundary conditions. Maxwell equations are discussed, along with wave equation and scattered, diffracted and fringe fields. Geometric optics, as well as the geometric theory of diffraction are explained. With MATLAB scripts included for several well-known electromagnetic diffraction problems, this book discusses diffraction fundamentals of two-dimensional structures with different boundary conditions and analytical numerical methods that are used to show diffraction. The book introduces fundamental concepts of electromagnetic problems, identities, and definitions for diffraction modeling. Basic coordinate systems, boundary conditions, wave equation, and Green's function problem are given. The scattered fields, diffracted fields, and fringe fields, radar cross section for diffraction modeling are presented. Behaviors of electromagnetic waves around the two-dimensional canonical wedge and canonical strip are also explored. Diffraction of trilateral cylinders and wedges with rounded edges is investigated as well as double tip diffraction using Finite Difference Time Domain and Method of Moments. A

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MATLAB based virtual tool, developed with graphical user interface (GUI), for the visualization of both fringe currents and fringe waves is included, using numerical FDTD and MoM algorithm and High-Frequency Asymptotics approaches.

This text is an introduction to Simulink, a companion application to MATLAB. It is written for students at the undergraduate and graduate programs, as well as for the working professional. Although some previous knowledge of MATLAB would be helpful, it is not absolutely necessary; Appendix A of this text is an Introduction to MATLAB to enable the reader to begin learning both MATLAB and Simulink to perform graphical computations and programming. Chapters 2 through 18 describe the blocks of all Simulink libraries. Their application is illustrated with practical examples through Simulink models, some of which are supplemented with MATLAB functions, commands, and statements. Chapters 1 and 19 contain several Simulink models to illustrate various applied math and engineering applications. Appendix B is an introduction to difference equations as they apply to discrete-time systems, and Appendix C introduces the reader to random generation procedures. This text supplements our Numerical Analysis with MATLAB and Spreadsheet Applications, ISBN 0-9709511-1-6. It is self-contained; the blocks of each library are described in an orderly fashion that is consistent with Simulink's documentation. This arrangement provides insight into

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how a model is used and how its parts interact with each another. Like MATLAB, Simulink can be used with both linear and nonlinear systems, which can be modeled in continuous time, sample time, or a hybrid of these. Examples are provided in this text. Most of the examples presented in this book can be implemented with the Student Versions of MATLAB and Simulink. A few may require the full versions of these outstanding packages, and can be skipped. Some add-ons, known as Toolboxes and Blocksets can be obtained from The MathWorks, Inc., 3 Apple Hill Drive, Natick, MA 01760-2098, USA, www.mathworks.com.

This book offers a detailed guide to the design and simulation of basic control methods applied to microgrids in various operating modes, using MATLAB® Simulink® software. It includes discussions on the performance of each configuration, as well as the advantages and limitations of the droop control method. The content is organised didactically, with a level of mathematical and scientific rigour suitable for undergraduate and graduate programmes, as well as for industry professionals. The use of MATLAB® Simulink® software facilitates the learning process with regard to modelling and simulating power electronic converters at the interface of distributed energy resource (DER) systems. The book also features a wealth of illustrations, schematics, and simulation results.

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Given its scope, it will greatly benefit undergraduate and graduate students in the fields of electrical and electronics engineering, as well as professionals working in microgrid design and implementation.

Simulation of ODE/PDE Models with MATLAB®, OCTAVE and SCILAB shows the reader how to exploit a fuller array of numerical methods for the analysis of complex scientific and engineering systems than is conventionally employed. The book is dedicated to numerical simulation of distributed parameter systems described by mixed systems of algebraic equations, ordinary differential equations (ODEs) and partial differential equations (PDEs). Special attention is paid to the numerical method of lines (MOL), a popular approach to the solution of time-dependent PDEs, which proceeds in two basic steps: spatial discretization and time integration. Besides conventional finite-difference and element techniques, more advanced spatial-approximation methods are examined in some detail, including nonoscillatory schemes and adaptive-grid approaches. A MOL toolbox has been developed within MATLAB®/OCTAVE/SCILAB. In addition to a set of spatial approximations and time integrators, this toolbox includes a collection of application examples, in specific areas, which can serve as templates for developing new programs. Simulation of ODE/PDE Models with MATLAB®, OCTAVE and SCILAB provides

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a practical introduction to some advanced computational techniques for dynamic system simulation, supported by many worked examples in the text, and a collection of codes available for download from the book's page at www.springer.com. This text is suitable for self-study by practicing scientists and engineers and as a final-year undergraduate course or at the graduate level. An introduction to technical details related to the Physical Layer of the LTE standard with MATLAB(r)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 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(r) algorithms needed to simulate the standard. The use of MATLAB(r), a widely used technical computing language, is one of the distinguishing features of this book. Through a series of MATLAB(r) 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-by-step process, readers will achieve deeper understanding of LTE concepts and specifications through simulations. Key Features:*

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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(r), which build knowledge gradually and incrementally until a functional specification for the LTE PHY is attained* Accompanying Web site includes all MATLAB(r) programs, together with PowerPoint slides and other illustrative examples

Dr Houman 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 University and MSc and PhD degrees in Telecommunications from the Institut Nationale de la Recherche Scientifique, in Canada.

Combining control theory and modeling, this textbook introduces and builds on methods for simulating and tackling concrete problems in a variety of applied sciences. Emphasizing "learning by doing," the authors focus on examples and

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applications to real-world problems. An elementary presentation of advanced concepts, proofs to introduce new ideas, and carefully presented MATLAB® programs help foster an understanding of the basics, but also lead the way to new, independent research. With minimal prerequisites and exercises in each chapter, this work serves as an excellent textbook and reference for graduate and advanced undergraduate students, researchers, and practitioners in mathematics, physics, engineering, computer science, as well as biology, biotechnology, economics, and finance.

Wiley introduces a new offering in dynamic systems--Dynamic Systems: Modeling, Simulation, and Control by Craig Kluever. This text highlights essential topics such as analysis, design, and control of physical engineering systems, often composed of interacting mechanical, electrical and fluid subsystem components. Dynamic Systems: Modeling, Simulation, and Control is intended for an introductory course in dynamic systems and control, and written for mechanical engineering and other engineering curricula. Major topics covered in this text include mathematical modeling, system-response analysis, and an introduction to feedback control systems. Dynamic Systems integrates an early introduction to numerical simulation using MATLAB's Simulink for integrated systems. Simulink and MATLAB tutorials for both software programs will also be

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provided. The author's text also has a strong emphasis on real-world case studies. Derived from top-tier engineering from the AMSE Journal of Dynamic Systems, Measurement, and Control, case studies are leveraged to demonstrate fundamental concepts as well as the analysis of complex engineering systems. In addition, Dynamic Systems delivers a wide variety of end of chapter problems, including conceptual problems, MATLAB problems, and Engineering Application problems.

Introduction to Modeling and Simulation with MATLAB and Python is intended for students and professionals in science, social science, and engineering that wish to learn the principles of computer modeling, as well as basic programming skills. The book content focuses on meeting a set of basic modeling and simulation competencies that were developed as part of several National Science Foundation grants. Even though computer science students are much more expert programmers, they are not often given the opportunity to see how those skills are being applied to solve complex science and engineering problems and may also not be aware of the libraries used by scientists to create those models. The book interleaves chapters on modeling concepts and related exercises with programming concepts and exercises. The authors start with an introduction to modeling and its importance to current practices in the sciences and engineering.

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They introduce each of the programming environments and the syntax used to represent variables and compute mathematical equations and functions. As students gain more programming expertise, the authors return to modeling concepts, providing starting code for a variety of exercises where students add additional code to solve the problem and provide an analysis of the outcomes. In this way, the book builds both modeling and programming expertise with a "just-in-time" approach so that by the end of the book, students can take on relatively simple modeling example on their own. Each chapter is supplemented with references to additional reading, tutorials, and exercises that guide students to additional help and allows them to practice both their programming and analytical modeling skills. In addition, each of the programming related chapters is divided into two parts – one for MATLAB and one for Python. In these chapters, the authors also refer to additional online tutorials that students can use if they are having difficulty with any of the topics. The book culminates with a set of final project exercise suggestions that incorporate both the modeling and programming skills provided in the rest of the volume. Those projects could be undertaken by individuals or small groups of students. The companion website at <http://www.intromodeling.com> provides updates to instructions when there are substantial changes in software versions, as well as electronic copies of

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exercises and the related code. The website also offers a space where people can suggest additional projects they are willing to share as well as comments on the existing projects and exercises throughout the book. Solutions and lecture notes will also be available for qualifying instructors.

This book accomplishes two things simultaneously: it teaches you to use the latest version of the powerful MATLAB programming environment, and it teaches you core, transferrable programming skills that will make you feel at home with most procedural programming languages. MATLAB has been in existence for more than 30 years and is used by millions of engineers, scientists, and students worldwide, both for its depth and its easy usability. With dozens of specialized toolboxes available beyond the core program, as well as its companion program Simulink for simulation and model-based design, MATLAB can serve as an invaluable aid throughout your career. Unlike many MATLAB books, ours assumes no prior experience in computer programming. Using an approachable tone, we take you from the simplest variables through complex examples of data visualization and curve fitting. Each chapter builds on the last, presenting an in-depth tutorial on a focused concept central to programming, using the MATLAB language, but applicable to countless other popular and in-demand languages such as C++, Java, JavaScript, R, and Python. We'll ask you to perform short exercises as we work through each chapter, followed by more end-to-end exercises and mental challenges at the chapter's end. As the complexity of the concepts increases, the

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exercises present increasingly real-world engineering challenges to match. Once you've completed *An Engineer's Introduction to Programming with MATLAB 2018*, you will have a solid foundation in computer programming forms and concepts and a comfort with the MATLAB environment and programming language. We believe that you'll enjoy both gaining and having that knowledge, and that you'll be able to use it almost immediately with your other coursework.

This book provides a broad-ranging, but detailed overview of the basics of Fuzzy Logic. The fundamentals of Fuzzy Logic are discussed in detail, and illustrated with various solved examples. The book also deals with applications of Fuzzy Logic, to help readers more fully understand the concepts involved. Solutions to the problems are programmed using MATLAB 6.0, with simulated results. The MATLAB Fuzzy Logic toolbox is provided for easy reference.

Employ essential and hands-on tools and functions of the MATLAB and Simulink packages, which are explained and demonstrated via interactive examples and case studies. This book contains dozens of simulation models and solved problems via m-files/scripts and Simulink models which help you to learn programming and modeling essentials. You'll become efficient with many of the built-in tools and functions of MATLAB/Simulink while solving engineering and scientific computing problems. *Beginning MATLAB and Simulink* explains various practical issues of programming and modelling in parallel by comparing MATLAB and Simulink. After reading and using this

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book, you'll be proficient at using MATLAB and applying the source code from the book's examples as templates for your own projects in data science or engineering. What You Will Learn Get started using MATLAB and Simulink Carry out data visualization with MATLAB Gain the programming and modeling essentials of MATLAB Build a GUI with MATLAB Work with integration and numerical root finding methods Apply MATLAB to differential equations-based models and simulations Use MATLAB for data science projects Who This Book Is For Engineers, programmers, data scientists, and students majoring in engineering and scientific computing. Not only do modeling and simulation help provide a better understanding of how real-world systems function, they also enable us to predict system behavior before a system is actually built and analyze systems accurately under varying operating conditions. Modeling and Simulation of Systems Using MATLAB® and Simulink® provides comprehensive, state-of-the-art coverage of all the important aspects of modeling and simulating both physical and conceptual systems. Various real-life examples show how simulation plays a key role in understanding real-world systems. The author also explains how to effectively use MATLAB and Simulink software to successfully apply the modeling and simulation techniques presented. After introducing the underlying philosophy of systems, the book offers step-by-step procedures for modeling different types of systems using modeling techniques, such as the graph-theoretic approach, interpretive structural modeling, and system dynamics modeling. It then explores how

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simulation evolved from pre-computer days into the current science of today. The text also presents modern soft computing techniques, including artificial neural networks, fuzzy systems, and genetic algorithms, for modeling and simulating complex and nonlinear systems. The final chapter addresses discrete systems modeling. Preparing both undergraduate and graduate students for advanced modeling and simulation courses, this text helps them carry out effective simulation studies. In addition, graduate students should be able to comprehend and conduct simulation research after completing this book.

The purpose of this Synthesis Lecture is to provide basic theoretical analyses of Phase-Locked Loop (PLL) and devices derived from the PLL and their simulation models suitable for supplementing undergraduate and graduate courses in communications and for self study by practicing engineers. A significant component of this book is a set of basic MATLAB-based simulations that illustrate the operating characteristics of these devices and enable the reader to investigate the impact of varying system parameters. This Synthesis Lecture by no means provides a comprehensive treatment of the underlying theory of phase-locked loops. There are many excellent books currently available that treat this subject in considerable technical depth. In this treatment, however, theoretical analyses are provided in sufficient detail in order to explain how simulations are developed. Table of Contents: Introduction / The Phase-Locked Loop / Devices Derived from the Phase-Locked Loop / Noise Performance Analysis /

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Simulation Models / MATLAB Simulations / Appendix A: Complex Envelope
Repressions of Bandpass Signals / Appendix B: Phase Detector and VCO Models /
Appendix C: Discrete-Time Approximations to Continuous-Time Integration / Appendix
D: Simulation Code for the Basic PLL / Appendix E: SIMULINK Models / Appendix F:
MATLAB m-files

An introduction to modeling and simulating physical systems with MATLAB, mathematical computing software for engineers and scientists. A concise introduction to programming and modeling real world systems with MATLAB, a popular programming language for science and engineering. Unlike competing books which are often too mathematical and theoretical, this book by best-selling author Allen Downey is designed to be practical, with an emphasis on thinking about how to design and use models. The author shows the reader that systems may have many possible models and shows them how to justify modeling decisions, choose appropriate models, validate their choices, and iteratively improve their models. Readers are taught basic programming skills and how to combine them with MATLAB to model and simulate systems like population growth, baseball flight trajectories, bungee jumping, and celestial mechanics. For example, the book explores concepts like the Penny Drop Myth: the claim that a penny dropped from the top of the Empire State Building lands with enough force to injure a person or the sidewalk. The author addresses this myth by developing and implementing three models of the system, including or excluding

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features like air resistance and spin. Other physical systems include world population growth, infectious disease, the coffee cooling problem, baseball trajectories, bungee jumping, and celestial mechanics. Readers learn to use MATLAB to visualize and summarize their results, as well as how to use their models to predict, explain, and design systems. The book presents applications from a range of areas including demography, thermodynamics, epidemiology, ecology, pharmacokinetics, and mechanics. Numerous exercises, sample code, and MATLAB Live Scripts (notebooks that include code, results, and explanatory text) help the reader develop the knowledge and skills necessary to work comfortably in MATLAB.

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