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A Course in Ordinary Differential Equations, Second Edition teaches students how to use analytical and numerical solution methods in typical engineering, physics, and mathematics applications. Lauded for its extensive computer code and student-friendly approach, the first edition of this popular textbook was the first on ordinary differential equations (ODEs) to include instructions on using MATLAB®, Mathematica®, and Maple™. This second edition reflects the feedback of

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students and professors who used the first edition in the classroom. New to the Second Edition Moves the computer codes to Computer Labs at the end of each chapter, which gives professors flexibility in using the technology Covers linear systems in their entirety before addressing applications to nonlinear systems Incorporates the latest versions of MATLAB, Maple, and Mathematica Includes new sections on complex variables, the exponential response formula for solving nonhomogeneous equations, forced vibrations, and nondimensionalization Highlights

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new applications and modeling in many fields Presents exercise sets that progress in difficulty Contains color graphs to help students better understand crucial concepts in ODEs Provides updated and expanded projects in each chapter Suitable for a first undergraduate course, the book includes all the basics necessary to prepare students for their future studies in mathematics, engineering, and the sciences. It presents the syntax from MATLAB, Maple, and Mathematica to give students a better grasp of the theory and gain more insight into real-world problems. Along

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with covering traditional topics, the text describes a number of modern topics, such as direction fields, phase lines, the Runge-Kutta method, and epidemiological and ecological models. It also explains concepts from linear algebra so that students acquire a thorough understanding of differential equations.

This interdisciplinary book presents numerical techniques needed for chemical and biological engineers using Matlab. The book begins by exploring general cases, and moves on to specific ones. The text includes a large number of detailed illustrations, exercises

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and industrial examples. The book provides detailed mathematics and engineering background in the appendixes, including an introduction to Matlab. The text will be useful to undergraduate students in chemical/biological engineering, and in applied mathematics and numerical analysis.

Elementary Differential Equations presents the standard material in a first course on differential equations, including all standard methods which have been a part of the subject since the time of Newton and the Bernoulli brothers. The emphasis in this book is on theory and methods and

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differential equations as a part of analysis. Differential equations is worth studying, rather than merely some recipes to be used in physical science. The text gives substantial emphasis to methods which are generally presented first with theoretical considerations following. Essentially all proofs of the theorems used are included, making the book more useful as a reference. The book mentions the main computer algebra systems, yet the emphasis is placed on MATLAB and numerical methods which include graphing the solutions and obtaining tables of values.

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Featured applications are easily understood. Complete explanations of the mathematics and emphasis on methods for finding solutions are included.

Taking a straightforward, logical approach that emphasizes

symmetry and crystal

relationships, Foundations of

Crystallography with Computer Applications, Second Edition

provides a thorough explanation of the topic for students

studying the solid state in

chemistry, physics, materials science, geological sciences,

and engineering. It is also written

Volume I: Experimental

Observations

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Numerical Computing with
MATLAB

Foundations of Crystallography
with Computer Applications

A MATLAB Exercise Book

Introduction to Linear

Optimization and Extensions
with MATLAB

An Introduction to Numerical
Analysis for Electrical and
Computer Engineers

MATLAB Programming for
Engineers Thomson Nelson

This book is a compendium of
fundamental mathematical
concepts, methods, models, and
their wide range of applications
in diverse fields of engineering. It
comprises essentially a

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comprehensive and contemporary coverage of those areas of mathematics which provide foundation to electronic, electrical, communication, petroleum, chemical, civil, mechanical, biomedical, software, and financial engineering. It gives a fairly extensive treatment of some of the recent developments in mathematics which have found very significant applications to engineering problems.

The revised and updated new edition of the popular optimization book for engineers
The thoroughly revised and updated fifth edition of

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Engineering Optimization: Theory and Practice offers engineers a guide to the important optimization methods that are commonly used in a wide range of industries. The author—a noted expert on the topic—presents both the classical and most recent optimizations approaches. The book introduces the basic methods and includes information on more advanced principles and applications. The fifth edition presents four new chapters: Solution of Optimization Problems Using MATLAB; Metaheuristic Optimization Methods; Multi-Objective

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Optimization Methods; and Practical Implementation of Optimization. All of the book's topics are designed to be self-contained units with the concepts described in detail with derivations presented. The author puts the emphasis on computational aspects of optimization and includes design examples and problems representing different areas of engineering. Comprehensive in scope, the book contains solved examples, review questions and problems. This important book: Offers an updated edition of the classic work on optimization Includes approaches that are

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appropriate for all branches of engineering Contains numerous practical design and engineering examples Offers more than 140 illustrative examples, 500 plus references in the literature of engineering optimization, and more than 500 review questions and answers Demonstrates the use of MATLAB for solving different types of optimization problems using different techniques Written for students across all engineering disciplines, the revised edition of Engineering Optimization: Theory and Practice is the comprehensive book that covers the new and recent methods of

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optimization and reviews the principles and applications. Over the last few decades, optimization techniques have been streamlined by the use of computers and artificial intelligence methods to analyze more variables (especially under non-linear, multivariable conditions) more quickly than ever before. This book covers all classical linear and nonlinear optimization techniques while focusing on the standard mathematical engine, MATLAB. As with the first edition, the author uses MATLAB in examples for running computer-based optimization problems.

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New coverage in this edition includes design optimization techniques such as Multidisciplinary Optimization, Explicit Solution for Boundary Value Problems, and Particle Swarm Optimization.

Matlab

Practical QFT Solutions

MATLAB 5 for Engineers

A Course in Differential

Equations with Boundary Value Problems, Second Edition

An Introduction With Applications

Applied Optimization with

MATLAB Programming

Obtain the Best Estimate of a Strongly Scattering Object from Limited Scattered Field Data Introduction to

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Imaging from Scattered Fields presents an overview of the challenging problem of determining information about an object from measurements of the field scattered from that object. It covers widely used approaches to recover information about the objects and examines the assumptions made a priori about the object and the consequences of recovering object information from limited numbers of noisy measurements of the scattered fields. The book explores the strengths and weaknesses of using inverse methods for weak scattering. These methods, including Fourier-based signal and image processing techniques, allow more straightforward inverse algorithms to be exploited based on a simple mapping of scattered field data. The authors also discuss their recent

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approach based on a nonlinear filtering step in the inverse algorithm. They illustrate how to use this algorithm through numerous two-dimensional electromagnetic scattering examples. MATLAB® code is provided to help readers quickly apply the approach to a wide variety of inverse scattering problems. In later chapters of the book, the authors focus on important and often forgotten overarching constraints associated with exploiting inverse scattering algorithms. They explain how the number of degrees of freedom associated with any given scattering experiment can be found and how this allows one to specify a minimum number of data that should be measured. They also describe how the prior discrete Fourier transform (PDFT) algorithm helps in estimating

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the properties of an object from scattered field measurements. The PDFT restores stability and improves estimates of the object even with severely limited data (provided it is sufficient to meet a criterion based on the number of degrees of freedom). Suitable for graduate students and researchers working on medical, geophysical, defense, and industrial inspection inverse problems, this self-contained book provides the necessary details for readers to design improved experiments and process measured data more effectively. It shows how to obtain the best estimate of a strongly scattering object from limited scattered field data. Transfer function form, zpk, state space, modal, and state space modal forms. For someone learning dynamics for the first time or for

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engineers who use the tools infrequently, the options available for constructing and representing dynamic mechanical models can be daunting. It is important to find a way to put them all in perspective and have them available for quick reference. It is also important to have a strong understanding of modal analysis, from which the total response of a system can be constructed. Finally, it helps to know how to take the results of large dynamic finite element models and build small MATLAB® state space models. *Vibration Simulation Using MATLAB and ANSYS* answers all those needs. Using a three degree-of-freedom (DOF) system as a unifying theme, it presents all the methods in one book. Each chapter provides the background theory to support its example, and each chapter contains

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both a closed form solution to the problem-shown in its entirety-and detailed MATLAB code for solving the problem. Bridging the gap between introductory vibration courses and the techniques used in actual practice, Vibration Simulation Using MATLAB and ANSYS builds the foundation that allows you to simulate your own real-life problems. Features Demonstrates how to solve real problems, covering the vibration of systems from single DOF to finite element models with thousands of DOF Illustrates the differences and similarities between different models by tracking a single example throughout the book Includes the complete, closed-form solution and the MATLAB code used to solve each problem Shows explicitly how to take the results of a realistic ANSYS finite element model and develop a small

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MATLAB state-space model Provides a solid grounding in how individual modes of vibration combine for overall system response

A concise introduction to numerical methods and the

mathematical framework needed to understand their performance

Numerical Solution of Ordinary Differential Equations presents a

complete and easy-to-follow

introduction to classical topics in the

numerical solution of ordinary

differential equations. The book's

approach not only explains the

presented mathematics, but also helps

readers understand how these

numerical methods are used to solve

real-world problems. Unifying

perspectives are provided throughout

the text, bringing together and

categorizing different types of

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problems in order to help readers comprehend the applications of ordinary differential equations. In addition, the authors' collective academic experience ensures a coherent and accessible discussion of key topics, including: Euler's method Taylor and Runge-Kutta methods General error analysis for multi-step methods Stiff differential equations Differential algebraic equations Two-point boundary value problems Volterra integral equations Each chapter features problem sets that enable readers to test and build their knowledge of the presented methods, and a related Web site features MATLAB® programs that facilitate the exploration of numerical methods in greater depth. Detailed references outline additional literature on both analytical and numerical aspects of

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ordinary differential equations for further exploration of individual topics. Numerical Solution of Ordinary Differential Equations is an excellent textbook for courses on the numerical solution of differential equations at the upper-undergraduate and beginning graduate levels. It also serves as a valuable reference for researchers in the fields of mathematics and engineering. Master the finite element method with this masterful and practical volume An Introduction to the Finite Element Method (FEM) for Differential Equations provides readers with a practical and approachable examination of the use of the finite element method in mathematics. Author Mohammad Asadzadeh covers basic FEM theory, both in one-dimensional and higher dimensional

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cases. The book is filled with concrete strategies and useful methods to simplify its complex mathematical contents. Practically written and carefully detailed, An Introduction to the Finite Element Method covers topics including: An introduction to basic ordinary and partial differential equations The concept of fundamental solutions using Green's function approaches Polynomial approximations and interpolations, quadrature rules, and iterative numerical methods to solve linear systems of equations Higher-dimensional interpolation procedures Stability and convergence analysis of FEM for differential equations This book is ideal for upper-level undergraduate and graduate students in natural science and engineering. It belongs on the shelf of anyone

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seeking to improve their understanding of differential equations.

A Course in Ordinary Differential Equations

Design, Analysis, and Computer Implementation of Algorithms

Communication Systems Principles Using MATLAB

Multi-objective Optimization

MATLAB Programming for Engineers

Robust Control Engineering

The purpose of this introductory book is to

couple the teaching of chaotic circuit and systems theory with the use of field

programmable gate arrays (FPGAs). As such, it differs from other texts

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on chaos: first, it puts emphasis on combining theoretical methods, simulation tools and physical realization to help the reader gain an intuitive understanding of the properties of chaotic systems. Second, the "medium" used for physical realization is the FPGA. These devices are massively parallel architectures that can be configured to realize a variety of logic functions. Hence, FPGAs can be configured to emulate systems of

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differential equations. Nevertheless maximizing the capabilities of an FPGA requires the user to understand the underlying hardware and also FPGA design software. This is achieved by the third distinctive feature of this book: a lab component in each chapter. Here, readers are asked to experiment with computer simulations and FPGA designs, to further their understanding of concepts covered in the

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book. This text is intended for graduate students in science and engineering interested in exploring implementation of nonlinear dynamical (chaotic) systems on FPGAs.

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

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accessible format without the need to master a large body of theory. The text puts the focus 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

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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 shortest-path are introduced with simple and concrete examples. The treatment of advanced telecommunications topics extends to OFDM for wireless modulation,

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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 better

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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. This textbook presents a variety of applied mathematics topics in science and engineering with an emphasis on

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problem solving techniques using MATLAB®. The authors provide a general overview of the MATLAB language and its graphics abilities before delving into problem solving, making the book useful for readers without prior MATLAB experience. They explain how to generate code suitable for various applications so that readers can apply the techniques to problems not covered in the book. Examples,

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figures, and MATLAB scripts enable readers with basic mathematics knowledge to solve various applied math problems in their fields while avoiding unnecessary technical details.

Developed from the author's graduate-level courses, the first edition of this book filled the need for a comprehensive, self-contained, and hands-on treatment of radar systems analysis and design. It quickly

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became a bestseller and was widely adopted by many professors. The second edition built on this successful format by rearranging and updating

Discrete Fourier
Analysis and Wavelets
For Beginners and
Experienced Users
Elementary Differential
Equations
Vibration Simulation
Using MATLAB and ANSYS
Advanced Engineering
Mathematics with MATLAB,
Fourth Edition

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Delivers an appropriate mix of theory and applications to help readers understand the process and problems of image and signal analysis Maintaining a comprehensive and accessible treatment of the concepts, methods, and applications of signal and image data transformation, this Second Edition of Discrete Fourier Analysis and Wavelets: Applications to Signal and Image Processing features updated and revised coverage throughout with an emphasis on key and recent developments in the field of signal and image processing. Topical coverage includes: vector spaces, signals, and images; the discrete Fourier transform; the discrete cosine transform;

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convolution and filtering; windowing and localization; spectrograms; frames; filter banks; lifting schemes; and wavelets. Discrete Fourier Analysis and Wavelets introduces a new chapter on frames—a new technology in which signals, images, and other data are redundantly measured. This redundancy allows for more sophisticated signal analysis. The new coverage also expands upon the discussion on spectrograms using a frames approach. In addition, the book includes a new chapter on lifting schemes for wavelets and provides a variation on the original low-pass/high-pass filter bank approach to the design and implementation of wavelets. These new chapters also

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include appropriate exercises and MATLAB® projects for further experimentation and practice. • Features updated and revised content throughout, continues to emphasize discrete and digital methods, and utilizes MATLAB® to illustrate these concepts • Contains two new chapters on frames and lifting schemes, which take into account crucial new advances in the field of signal and image processing • Expands the discussion on spectrograms using a frames approach, which is an ideal method for reconstructing signals after information has been lost or corrupted (packet erasure) • Maintains a comprehensive treatment of linear signal processing

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for audio and image signals with a well-balanced and accessible selection of topics that appeal to a diverse audience within mathematics and engineering • Focuses on the underlying mathematics, especially the concepts of finite-dimensional vector spaces and matrix methods, and provides a rigorous model for signals and images based on vector spaces and linear algebra methods • Supplemented with a companion website containing solution sets and software exploration support for MATLAB and SciPy (Scientific Python) Thoroughly class-tested over the past fifteen years, Discrete Fourier Analysis and Wavelets: Applications to Signal and Image

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Processing is an appropriately self-contained book ideal for a one-semester course on the subject. S. Allen Broughton, PhD, is Professor Emeritus of Mathematics at Rose-Hulman Institute of Technology. Dr. Broughton is a member of the American Mathematical Society (AMS) and the Society for the Industrial Applications of Mathematics (SIAM), and his research interests include the mathematics of image and signal processing, and wavelets. Kurt Bryan, PhD, is Professor of Mathematics at Rose-Hulman Institute of Technology. Dr. Bryan is a member of MAA and SIAM and has authored over twenty peer-reviewed journal articles.

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style="position: absolute; left: -10000px; top: 0px; width: 1px; height: 1px; overflow: hidden;"Kurt Bryan, PhD, is Professor of Mathematics at Rose-Hulman Institute of Technology. Dr. Bryan is a member of MAA and SIAM and has authored over twenty peer-reviewed journal articles. Maintaining a comprehensive and accessible treatment of the concepts, methods, and applications of signal and image data transformation, this Second Edition of *Discrete Fourier Analysis and Wavelets: Applications to Signal and Image Processing* features updated and r

Advanced Engineering Mathematics with MATLAB, Fourth Edition builds upon three successful previous

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editions. It is written for today's STEM (science, technology, engineering, and mathematics) student. Three assumptions underlie its structure: (1) All students need a firm grasp of the traditional disciplines of ordinary and partial differential equations, vector calculus and linear algebra. (2) The modern student must have a strong foundation in transform methods because they provide the mathematical basis for electrical and communication studies. (3) The biological revolution requires an understanding of stochastic (random) processes. The chapter on Complex Variables, positioned as the first chapter in previous editions, is now moved to Chapter 10. The

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author employs MATLAB to reinforce concepts and solve problems that require heavy computation. Along with several updates and changes from the third edition, the text continues to evolve to meet the needs of today's instructors and students.

Computational finance is increasingly important in the financial industry, as a necessary instrument for applying theoretical models to real-world challenges. Indeed, many models used in practice involve complex mathematical problems, for which an exact or a closed-form solution is not available. Consequently, we need to rely on computational techniques and specific numerical algorithms.

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This book combines theoretical concepts with practical implementation. Furthermore, the numerical solution of models is exploited, both to enhance the understanding of some mathematical and statistical notions, and to acquire sound programming skills in MATLAB®, which is useful for several other programming languages also. The material assumes the reader has a relatively limited knowledge of mathematics, probability, and statistics. Hence, the book contains a short description of the fundamental tools needed to address the two main fields of quantitative finance: portfolio selection and derivatives pricing. Both fields are developed here, with

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a particular emphasis on portfolio selection, where the author includes an overview of recent approaches. The book gradually takes the reader from a basic to medium level of expertise by using examples and exercises to simplify the understanding of complex models in finance, giving them the ability to place financial models in a computational setting. The book is ideal for courses focusing on quantitative finance, asset management, mathematical methods for economics and finance, investment banking, and corporate finance.

This book focuses the solutions of differential equations with MATLAB. Analytical solutions of differential

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equations are explored first, followed by the numerical solutions of different types of ordinary differential equations (ODEs), as well as the universal block diagram based schemes for ODEs. Boundary value ODEs, fractional-order ODEs and partial differential equations are also discussed.

A Guide to MATLAB

GPU Programming in MATLAB

A Simple Bifurcation Approach

Differential Equation Solutions with

MATLAB®

Introduction to MATLAB for

Engineers

Revised Reprint

In MATLAB, Learn the essential skills needed to use the flexible MATLAB system. You will be able to apply the

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highly modular system towards the purposes you need by harnessing the power of its different toolboxes. This updated and expanded second edition of Book provides a user-friendly introduction to the subject, Taking a clear structural framework, it guides the reader through the subject's core elements. A flowing writing style combines with the use of illustrations and diagrams throughout the text to ensure the reader understands even the most complex of concepts. This succinct and enlightening overview is a required reading for all those interested in the subject . We hope you find this book useful in shaping your future career & Business.

Filling the need for an introductory book on linear programming that

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discusses the important ways to mitigate parameter uncertainty, Introduction to Linear Optimization and Extensions with MATLAB provides a concrete and intuitive yet rigorous introduction to modern linear optimization. In addition to fundamental topics, the book discusses current l

Emphasizing problem-solving skills throughout this very successful book, Stephen Chapman introduces the MATLAB® language and shows how to use it to solve typical technical problems. The book teaches MATLAB® as a technical programming language showing students how to write clean, efficient, and well-documented programs. It makes no pretense at being a complete

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description of all of MATLAB®'s hundreds of functions. Instead, it teaches students how to locate any desired function with MATLAB®'s extensive on line help facilities.

Overall, students develop problem-solving skills and are equipped for future courses and careers using the power of MATLAB®.

This book is an introduction to numerical analysis and intends to strike a balance between analytical rigor and the treatment of particular methods for engineering problems Emphasizes the earlier stages of numerical analysis for engineers with real-life problem-solving solutions applied to computing and engineering Includes MATLAB oriented examples An Instructor's Manual presenting detailed solutions to

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all the problems in the book is available from the Wiley editorial department.

An Introduction to the Finite Element Method for Differential Equations

Numerical Solution of Ordinary Differential Equations

Engineering Optimization

Modern Engineering Mathematics

Models, Analysis and Applications

Theory and Practice

This is a value pack of

MATLAB for Engineers:

International Version and

MATLAB & Simulink

Student Version 2011a

This is a short, focused introduction to MATLAB, a comprehensive software system for mathematical

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and technical computing. It contains concise explanations of essential MATLAB commands, as well as easily understood instructions for using MATLAB's programming features, graphical capabilities, simulation models, and rich desktop interface. Written for MATLAB 7, it can also be used with earlier (and later) versions of MATLAB. This book teaches how to graph functions, solve equations, manipulate

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images, and much more. It contains explicit instructions for using MATLAB's companion software, Simulink, which allows graphical models to be built for dynamical systems. MATLAB's new "publish" feature is discussed, which allows mathematical computations to be combined with text and graphics, to produce polished, integrated, interactive documents. For the beginner it explains everything

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needed to start using
MATLAB, while
experienced users making
the switch to MATLAB 7
from an earlier version
will also find much
useful information here.
This book thoroughly
covers the fundamentals
of the QFT robust
control, as well as
practical control
solutions, for unstable,
time-delay, non-minimum
phase or distributed
parameter systems,
plants with large model
uncertainty, high-
performance

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specifications,
nonlinear components,
multi-input multi-output
characteristics or
asymmetric topologies.
The reader will discover
practical applications
through a collection of
fifty successful, real
world case studies and
projects, in which the
author has been involved
during the last twenty-
five years, including
commercial wind
turbines, wastewater
treatment plants, power
systems, satellites with
flexible appendages,

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spacecraft, large radio telescopes, and industrial manufacturing systems. Furthermore, the book presents problems and projects with the popular QFT Control Toolbox (QFTCT) for MATLAB, which was developed by the author. Emphasizing problem-solving skills throughout, this fifth edition of Chapman's highly successful book teaches MATLAB as a technical programming language, showing students how to write

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clean, efficient, and well-documented programs, while introducing them to many of the practical functions of MATLAB. The first eight chapters are designed to serve as the text for an Introduction to Programming / Problem Solving course for first-year engineering students. The remaining chapters, which cover advanced topics such as I/O, object-oriented programming, and Graphical User Interfaces, may be

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covered in a longer course or used as a reference by engineering students or practicing engineers who use MATLAB. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Computational Finance
Numerical Methods
MATLAB Machine Learning
Mathematical Modeling
Higher Order Dynamic
Mode Decomposition and
Its Applications

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Solving Applied Mathematical Problems with MATLAB

This book is a comprehensive guide to machine learning with worked examples in MATLAB. It starts with an overview of the history of Artificial Intelligence and automatic control and how the field of machine learning grew from these. It provides descriptions of all major areas in machine learning. The book reviews commercially available packages for machine learning and shows how they fit into the field. The book then shows how MATLAB can be used to solve machine learning problems and how MATLAB graphics can enhance the programmer's understanding of the results and help users of their software grasp the results. Machine Learning can

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be very mathematical. The mathematics for each area is introduced in a clear and concise form so that even casual readers can understand the math. Readers from all areas of engineering will see connections to what they know and will learn new technology. The book then provides complete solutions in MATLAB for several important problems in machine learning including face identification, autonomous driving, and data classification. Full source code is provided for all of the examples and applications in the book. What you'll learn: An overview of the field of machine learning Commercial and open source packages in MATLAB How to use MATLAB for programming and building machine learning applications MATLAB graphics for machine learning

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Practical real world examples in MATLAB for major applications of machine learning in big data Who is this book for: The primary audiences are engineers and engineering students wanting a comprehensive and practical introduction to machine learning.

An introduction to MATLAB 5 within the context of solving engineering problems. The features new to MATLAB 5 include powerful program-development tools, new data types and structures, more graphic and visualization features and major improvements to MATLAB application toolboxes.

Almost every year, a new book on mathematical modeling is published, so, why another? The answer springs directly from the fact that it is very rare to find a

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book that covers modeling with all types of differential equations in one volume. Until now. *Mathematical Modeling: Models, Analysis and Applications* covers modeling with all kinds of differential equations, namely ordinary, partial, delay, and stochastic. The book also contains a chapter on discrete modeling, consisting of differential equations, making it a complete textbook on this important skill needed for the study of science, engineering, and social sciences. More than just a textbook, this how-to guide presents tools for mathematical modeling and analysis. It offers a wide-ranging overview of mathematical ideas and techniques that provide a number of effective approaches to problem solving. Topics covered include spatial, delayed,

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and stochastic modeling. The text provides real-life examples of discrete and continuous mathematical modeling scenarios. MATLAB® and Mathematica® are incorporated throughout the text. The examples and exercises in each chapter can be used as problems in a project. Since mathematical modeling involves a diverse range of skills and tools, the author focuses on techniques that will be of particular interest to engineers, scientists, and others who use models of discrete and continuous systems. He gives students a foundation for understanding and using the mathematics that is the basis of computers, and therefore a foundation for success in engineering and science streams.

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A revised textbook for introductory courses in numerical methods, MATLAB and technical computing, which emphasises the use of mathematical software.

Introduction to Imaging from Scattered Fields

A Route to Chaos Using FPGAs
Techniques and Applications in
Chemical Engineering

Radar Systems Analysis and Design
Using MATLAB

MATLAB® Oriented Modeling

Modern Financial Engineering:
Counterparty, Credit, Portfolio And
Systemic Risks

Higher Order Dynamic Mode
Decomposition and Its
Applications provides
detailed background

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theory, as well as several fully explained applications from a range of industrial contexts to help readers understand and use this innovative algorithm. Data-driven modelling of complex systems is a rapidly evolving field, which has applications in domains including engineering, medical, biological, and physical sciences, where it is providing ground-breaking insights into complex systems that exhibit rich multi-scale phenomena in both time and space. Starting with an

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introductory summary of established order reduction techniques like POD, DEIM, Koopman, and DMD, this book proceeds to provide a detailed explanation of higher order DMD, and to explain its advantages over other methods. Technical details of how the HODMD can be applied to a range of industrial problems will help the reader decide how to use the method in the most appropriate way, along with example MATLAB codes and advice on how to analyse and present results. Includes

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instructions for the implementation of the HODMD, MATLAB codes, and extended discussions of the algorithm Includes descriptions of other order reduction techniques, and compares their strengths and weaknesses Provides examples of applications involving complex flow fields, in contexts including aerospace engineering, geophysical flows, and wind turbine design

The book offers an overview of credit risk modeling and management. A

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three-step approach is adopted with the contents, after introducing the essential concepts of both mathematics and finance. Initially the focus is on the modeling of credit risk parameters mainly at the level of individual debtor and transaction, after which the book delves into counterparty credit risk, thus providing the link between credit and market risks. The second part is aimed at the portfolio level when multiple loans are pooled and default correlation becomes an

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important factor to consider and model. In this respect, the book explains how copulas help in modeling. The final stage is the macro perspective when the combination of credit risks related to financial institutions produces systemic risk and affects overall financial stability. The entire approach is two-dimensional as well. First, all modeling steps have replicable programming codes both in R and Matlab. In this way, the reader can experience

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the impact of changing the default probabilities of a given borrower or the weights of a sector.

Second, at each stage, the book discusses the regulatory environment.

This is because, at times, regulation can have stricter constraints than the outcome of internal models. In summary, the book guides the reader in modeling and managing credit risk by providing both the theoretical framework and the empirical tools necessary for a modern finance professional. In this

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sense, the book is aimed at a wide audience in all fields of study: from quants who want to engage in finance to economists who want to learn about coding and modern financial engineering. Designed for upper-division undergraduates in mathematics or computer science classes, the textbook assumes that students have prior knowledge of linear algebra and calculus, although these topics are reviewed in the text. Short discussions of the history of numerical

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methods are interspersed throughout the chapters. The book also includes polynomial interpolation at Chebyshev points, use of the MATLAB package Chebfun, and a section on the fast Fourier transform. Supplementary materials are available online.

Following a brief introduction and general review on the development of multi-objective optimization applications in chemical engineering since 2000, the book gives a description of selected multi-objective techniques

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and then goes on to discuss chemical engineering applications.

These applications are from diverse areas within chemical engineering, and are presented in detail.

Several exercises are included at the end of many chapters.

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GPU programming in MATLAB is intended for scientists, engineers,

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or students who develop or maintain applications in MATLAB and would like to accelerate their codes using GPU programming without losing the many benefits of MATLAB. The book starts with coverage of the Parallel Computing Toolbox and other MATLAB toolboxes for GPU computing, which allow applications to be ported straightforwardly onto GPUs without extensive knowledge of GPU programming. The next part covers built-in, GPU-enabled features of MATLAB, including options to leverage GPUs across multicore or different computer systems. Finally, advanced material includes CUDA code in MATLAB and optimizing existing GPU

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applications. Throughout the book, examples and source codes illustrate every concept so that readers can immediately apply them to their own development. Provides in-depth, comprehensive coverage of GPUs with MATLAB, including the parallel computing toolbox and built-in features for other MATLAB toolboxes Explains how to accelerate computationally heavy applications in MATLAB without the need to re-write them in another language Presents case studies illustrating key concepts across multiple fields Includes source code, sample datasets, and lecture slides

A Course in Differential Equations with Boundary Value Problems, 2nd

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Edition adds additional content to the author's successful A Course on Ordinary Differential Equations, 2nd Edition. This text addresses the need when the course is expanded. The focus of the text is on applications and methods of solution, both analytical and numerical, with emphasis on methods used in the typical engineering, physics, or mathematics student's field of study. The text provides sufficient problems so that even the pure math major will be sufficiently challenged. The authors offer a very flexible text to meet a variety of approaches, including a traditional course on the topic. The text can be used in courses when

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partial differential equations replaces Laplace transforms. There is sufficient linear algebra in the text so that it can be used for a course that combines differential equations and linear algebra. Most significantly, computer labs are given in MATLAB®, Mathematica®, and Maple™. The book may be used for a course to introduce and equip the student with a knowledge of the given software. Sample course outlines are included. Features MATLAB®, Mathematica®, and Maple™ are incorporated at the end of each chapter. All three software packages have parallel code and exercises; There are numerous problems of varying

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difficulty for both the applied and pure math major, as well as problems for engineering, physical science and other students. An appendix that gives the reader a "crash course" in the three software packages. Chapter reviews at the end of each chapter to help the students review Projects at the end of each chapter that go into detail about certain topics and introduce new topics that the students are now ready to see Answers to most of the odd problems in the back of the book

Scientific Computing with MATLAB®, Second Edition improves students' ability to tackle mathematical problems. It helps students understand the

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mathematical background and find reliable and accurate solutions to mathematical problems with the use of MATLAB, avoiding the tedious and complex technical details of mathematics. This edition retains the structure of its predecessor while expanding and updating the content of each chapter. The book bridges the gap between problems and solutions through well-grouped topics and clear MATLAB example scripts and reproducible MATLAB-generated plots. Students can effortlessly experiment with the scripts for a deep, hands-on exploration. Each chapter also includes a set of problems to strengthen understanding of the material.

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A practical guide to problem solving using MATLAB. Designed to complement a taught course introducing MATLAB but ideally suited for any beginner. This book provides a brief tour of some of the tasks that MATLAB is perfectly suited to instead of focusing on any particular topic. Providing instruction, guidance and a large supply of exercises, this book is meant to stimulate problem-solving skills rather than provide an in-depth knowledge of the MATLAB language.