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Engineering Design via Surrogate Modelling Alexander Forrester 2008-09-15
Surrogate models expedite the search for promising designs by standing in for expensive design evaluations or simulations. They provide a global model of some metric of a design (such as weight, aerodynamic drag, cost, etc.), which can then be optimized efficiently. Engineering Design via Surrogate Modelling is a self-contained guide to surrogate models and their use in engineering design. The fundamentals of building, selecting, validating, searching and refining a surrogate are presented in a manner accessible to novices in the field. Figures are used liberally to explain the key concepts and clearly show the differences between the various techniques, as well as to emphasize the intuitive nature of the conceptual and mathematical reasoning behind them. More advanced and recent concepts are each presented in stand-alone chapters, allowing the reader to concentrate on material pertinent to their current design problem, and concepts are clearly demonstrated using simple design problems. This collection of advanced concepts (visualization, constraint handling, coping with noisy data, gradient-enhanced modelling, multi-fidelity analysis and multiple objectives) represents an invaluable reference manual for engineers and researchers active in the area. Engineering Design via Surrogate Modelling is complemented by a suite of Matlab codes, allowing the reader to apply all the techniques presented to their own design problems. By applying statistical modelling to engineering design, this book bridges the wide gap between the engineering and statistics communities. It will appeal to postgraduates and researchers across the academic engineering design community as well as practising design engineers. Provides an inclusive and practical guide to using surrogates in engineering design. Presents the fundamentals of building, selecting, validating, searching and refining a surrogate model. Guides the reader through the practical implementation of a surrogate-based design process using a set of case studies from real engineering design challenges. Accompanied by a companion website featuring Matlab software at <http://www.wiley.com/go/forrester>

Visual and Computational Plasma Physics James J Y Hsu 2014-08-20 This book contains MATLAB programs to demonstrate the numerical algorithms, the analytical approaches, and the physical principles. It starts with single

particle, single fluid, and single wave, then the kinetic theory, the transport, the magnetohydrodynamics, and the nonlinear physics. The book emphasizes on the numerical algorithm and the analytical asymptology to tackle problems in plasma physics, and to demonstrate the underlying physics principles by graphical visualization. Students are introduced to the multiple time and multiple space scales as they learn the basic plasma phenomena, and are requested to solve problems with either MATLAB or C++. This book is targeting at the senior and graduate level. The emphasis of this book is to teach students to solve problems from the features and characteristics of the problem itself. It provides the students for the most important learning that is not knowing the solution, but knowing how to figure out the solution.

Computational Aerodynamic Modeling of Aerospace Vehicles Mehdi Ghoreyshi 2019-03-08 Currently, the use of computational fluid dynamics (CFD) solutions is considered as the state-of-the-art in the modeling of unsteady nonlinear flow physics and offers an early and improved understanding of air vehicle aerodynamics and stability and control characteristics. This Special Issue covers recent computational efforts on simulation of aerospace vehicles including fighter aircraft, rotorcraft, propeller driven vehicles, unmanned vehicle, projectiles, and air drop configurations. The complex flow physics of these configurations pose significant challenges in CFD modeling. Some of these challenges include prediction of vortical flows and shock waves, rapid maneuvering aircraft with fast moving control surfaces, and interactions between propellers and wing, fluid and structure, boundary layer and shock waves. Additional topic of interest in this Special Issue is the use of CFD tools in aircraft design and flight mechanics. The problem with these applications is the computational cost involved, particularly if this is viewed as a brute-force calculation of vehicle's aerodynamics through its flight envelope. To make progress in routinely using of CFD in aircraft design, methods based on sampling, model updating and system identification should be considered.

Turbulence In Coastal And Civil Engineering Sumer B Mutlu 2020-03-23

Distributed Cooperative Control Yi Guo 2017-04-03 Examines new cooperative control methodologies tailored to real-world applications in various domains such as in communication systems, physics systems, and multi-robotic systems Provides the fundamental mechanism for solving collective behaviors in naturally-occurring systems as well as cooperative behaviors in man-made systems Discusses cooperative control methodologies using real-world applications, including semi-conductor laser arrays, mobile sensor networks, and multi-robotic systems Includes results from the research group at the Stevens Institute of Technology to show how advanced control technologies can impact challenging issues, such as high energy systems and oil spill monitoring

Computational Partial Differential Equations Using MATLAB Jichun Li 2008-10-20 This textbook introduces several major numerical methods for solving various partial differential equations (PDEs) in science and engineering, including elliptic, parabolic, and hyperbolic equations. It covers traditional techniques that include the classic finite difference method and the finite element method as well as state-of-the-art numerical

Introduction to Finite Element Analysis Using MATLAB® and Abaqus Amar Khennane 2013-06-10 There are some books that target the theory of the finite element, while others focus on the programming side of things. Introduction to Finite

Element Analysis Using MATLAB® and Abaqus accomplishes both. This book teaches the first principles of the finite element method. It presents the theory of the finite element method while maintaining a balance between its mathematical formulation, programming implementation, and application using commercial software. The computer implementation is carried out using MATLAB, while the practical applications are carried out in both MATLAB and Abaqus. MATLAB is a high-level language specially designed for dealing with matrices, making it particularly suited for programming the finite element method, while Abaqus is a suite of commercial finite element software. Includes more than 100 tables, photographs, and figures Provides MATLAB codes to generate contour plots for sample results Introduction to Finite Element Analysis Using MATLAB and Abaqus introduces and explains theory in each chapter, and provides corresponding examples. It offers introductory notes and provides matrix structural analysis for trusses, beams, and frames. The book examines the theories of stress and strain and the relationships between them. The author then covers weighted residual methods and finite element approximation and numerical integration. He presents the finite element formulation for plane stress/strain problems, introduces axisymmetric problems, and highlights the theory of plates. The text supplies step-by-step procedures for solving problems with Abaqus interactive and keyword editions. The described procedures are implemented as MATLAB codes and Abaqus files can be found on the CRC Press website.

MODELING OF THE PHASE CHANGE MATERIAL OF A HYBRID STORAGE USING THE FINITE ELEMENT METHOD Lukas Kasper 2020-09-03 To increase the efficiency of energy-intensive industrial processes, thermal energy storages can offer new possibilities. A novel approach is investigated in the project HyStEPs. In this concept, containers filled with PCM are placed at the shell surface of a Ruths steam storage, to increase storage efficiency. In this work, a two-dimensional model using the finite element method is developed to simulate the PCM of the hybrid storage as designed in the HyStEPs project. The apparent heat capacity method is applied in a MATLAB implementation, considering heat transfer by both conduction and natural convection. This successfully validated code can handle any desired layout of materials arranged on a rectangular domain. Furthermore, a parameter study of different dimensions and orientations of the PCM cavity was conducted. The impact of natural convection was found to lead to significantly varying behaviour of the studied cavities with different orientation during the charging process, while it was found to be negligible during the discharging process.

Finite Elements and Fast Iterative Solvers Howard Elman 2014-06-19 This book is a description of why and how to do Scientific Computing for fundamental models of fluid flow. It contains introduction, motivation, analysis, and algorithms and is closely tied to freely available MATLAB codes that implement the methods described. The focus is on finite element approximation methods and fast iterative solution methods for the consequent linear(ized) systems arising in important problems that model incompressible fluid flow. The problems addressed are the Poisson equation, Convection-Diffusion problem, Stokes problem and Navier-Stokes problem, including new material on time-dependent problems and models of multi-physics. The corresponding iterative algebra based on preconditioned Krylov subspace and multigrid techniques is for symmetric and positive definite, nonsymmetric positive definite, symmetric indefinite and nonsymmetric indefinite matrix systems respectively. For each problem and associated solvers there is a description of how to compute together with theoretical analysis that guides the choice of approaches and describes what happens in practice in the many illustrative numerical results throughout the

book (computed with the freely downloadable IFISS software). All of the numerical results should be reproducible by readers who have access to MATLAB and there is considerable scope for experimentation in the "computational laboratory " provided by the software. Developments in the field since the first edition was published have been represented in three new chapters covering optimization with PDE constraints (Chapter 5); solution of unsteady Navier-Stokes equations (Chapter 10); solution of models of buoyancy-driven flow (Chapter 11). Each chapter has many theoretical problems and practical computer exercises that involve the use of the IFISS software. This book is suitable as an introduction to iterative linear solvers or more generally as a model of Scientific Computing at an advanced undergraduate or beginning graduate level.

Parallel Numerical Algorithms David E. Keyes 2012-12-06 In this volume, designed for computational scientists and engineers working on applications requiring the memories and processing rates of large-scale parallelism, leading algorithmicists survey their own field-defining contributions, together with enough historical and bibliographical perspective to permit working one's way to the frontiers. This book is distinguished from earlier surveys in parallel numerical algorithms by its extension of coverage beyond core linear algebraic methods into tools more directly associated with partial differential and integral equations - though still with an appealing generality - and by its focus on practical medium-granularity parallelism, approachable through traditional programming languages. Several of the authors used their invitation to participate as a chance to stand back and create a unified overview, which nonspecialists will appreciate.

An Introduction to Computational Fluid Dynamics The Finite Volume Method, 2/e Versteeg 2007

Spectral Methods Jie Shen 2011-08-25 Along with finite differences and finite elements, spectral methods are one of the three main methodologies for solving partial differential equations on computers. This book provides a detailed presentation of basic spectral algorithms, as well as a systematical presentation of basic convergence theory and error analysis for spectral methods. Readers of this book will be exposed to a unified framework for designing and analyzing spectral algorithms for a variety of problems, including in particular high-order differential equations and problems in unbounded domains. The book contains a large number of figures which are designed to illustrate various concepts stressed in the book. A set of basic matlab codes has been made available online to help the readers to develop their own spectral codes for their specific applications.

Numerical Methods: Think before You Compute E. J. Hinch 2020-04-30 This guide to computational fluid mechanics introduces beginning graduate students to the subject's standard methods and common pitfalls.

Partial Differential Equation Methods for Image Inpainting Carola-Bibiane Schönlieb 2015-10-26 This book introduces the mathematical concept of partial differential equations (PDE) for virtual image restoration. It provides insight in mathematical modelling, partial differential equations, functional analysis, variational calculus, optimisation and numerical analysis. It is addressed towards generally informed mathematicians and graduate students in mathematics with an interest in image processing and mathematical analysis.

An Introduction to Computational Fluid Mechanics by Example Sedat Biringer 2011-03-21 This new book builds on the original classic textbook entitled: An Introduction to Computational Fluid Mechanics by C. Y. Chow which was originally published in 1979. In the decades that have passed since this book was published the field of computational fluid dynamics has seen a number of changes in both the sophistication of the algorithms used but also advances in the computer hardware and software available. This new book incorporates the latest algorithms in the solution techniques and supports this by using numerous examples of applications to a broad range of industries from mechanical and aerospace disciplines to civil and the biosciences. The computer programs are developed and available in MATLAB. In addition the core text provides up-to-date solution methods for the Navier-Stokes equations, including fractional step time-advancement, and pseudo-spectral methods. The computer codes at the following website: www.wiley.com/go/biringer

Fluid Dynamics Peter S. Bernard 2015-05-05 This book provides a focused presentation of the physical and mathematical ideas upon which graduate work in fluid mechanics depends. The book includes a self-contained derivation of the governing equations followed by examples of their application. Numerous opportunities are provided to employ MATLAB in the study of fluid flows.

Interfacial Fluid Mechanics Vladimir S. Ajaev 2012-02-07 *Interfacial Fluid Mechanics: A Mathematical Modeling Approach* provides an introduction to mathematical models of viscous flow used in rapidly developing fields of microfluidics and microscale heat transfer. The basic physical effects are first introduced in the context of simple configurations and their relative importance in typical microscale applications is discussed. Then, several configurations of importance to microfluidics, most notably thin films/droplets on substrates and confined bubbles, are discussed in detail. Topics from current research on electrokinetic phenomena, liquid flow near structured solid surfaces, evaporation/condensation, and surfactant phenomena are discussed in the later chapters.

Numerical Solution of Differential Equations Zhilin Li 2017-11-30 A practical and concise guide to finite difference and finite element methods. Well-tested MATLAB® codes are available online.

Numerical Simulation in Fluid Dynamics Michael Griebel 1998-01-01 In this translation of the German edition, the authors provide insight into the numerical simulation of fluid flow. Using a simple numerical method as an expository example, the individual steps of scientific computing are presented: the derivation of the mathematical model; the discretization of the model equations; the development of algorithms; parallelization; and visualization of the computed data. In addition to the treatment of the basic equations for modeling laminar, transient flow of viscous, incompressible fluids - the Navier-Stokes equations - the authors look at the simulation of free surface flows; energy and chemical transport; and turbulence. Readers are enabled to write their own flow simulation program from scratch. The variety of applications is shown in several simulation results, including 92 black-and-white and 18 color illustrations. After reading this book, readers should be able to understand more enhanced algorithms of computational fluid dynamics and apply their new knowledge to other scientific fields.

Fluid Mechanics of Plankton Hidekatsu Yamazaki 2021-06-10 The cooperation between plankton biologists and fluid dynamists has enhanced our knowledge of

life within the plankton communities in ponds, lakes, and seas. This book assembled contributions on plankton-flow interactions, with an emphasis on syntheses and/or predictions. However, a wide range of novel insights, reasonable scenarios, and founded critiques are also considered in this book.

Introduction to Numerical Geodynamic Modelling Taras Gerya 2010 This user-friendly reference for students and researchers presents the basic mathematical theory, before introducing modelling of key geodynamic processes.

Finite Element Methods for Flow Problems Jean Donea 2003-06-02 In recent years there have been significant developments in the development of stable and accurate finite element procedures for the numerical approximation of a wide range of fluid mechanics problems. Taking an engineering rather than a mathematical bias, this valuable reference resource details the fundamentals of stabilised finite element methods for the analysis of steady and time-dependent fluid dynamics problems. Organised into six chapters, this text combines theoretical aspects and practical applications and offers coverage of the latest research in several areas of computational fluid dynamics. * Coverage includes new and advanced topics unavailable elsewhere in book form * Collection in one volume of the widely dispersed literature reporting recent progress in this field * Addresses the key problems and offers modern, practical solutions Due to the balance between the concise explanation of the theory and the detailed description of modern practical applications, this text is suitable for a wide audience including academics, research centres and government agencies in aerospace, automotive and environmental engineering.

An Introduction to Reservoir Simulation Using MATLAB/GNU Octave Knut-Andreas Lie 2019-06-30 This book provides a self-contained introduction to the simulation of flow and transport in porous media, written by a developer of numerical methods. The reader will learn how to implement reservoir simulation models and computational algorithms in a robust and efficient manner. The book contains a large number of numerical examples, all fully equipped with online code and data, allowing the reader to reproduce results, and use them as a starting point for their own work. All of the examples in the book are based on the MATLAB Reservoir Simulation Toolbox (MRST), an open-source toolbox popular popularity in both academic institutions and the petroleum industry. The book can also be seen as a user guide to the MRST software. It will prove invaluable for researchers, professionals and advanced students using reservoir simulation methods. This title is also available as Open Access on Cambridge Core.

Computational Mathematics Robert E. White 2015-11-11 *Computational Mathematics: Models, Methods, and Analysis with MATLAB® and MPI* is a unique book covering the concepts and techniques at the core of computational science. The author delivers a hands-on introduction to nonlinear, 2D, and 3D models; nonrectangular domains; systems of partial differential equations; and large algebraic problems requiring high-performance computing. The book shows how to apply a model, select a numerical method, implement computer simulations, and assess the ensuing results. Providing a wealth of MATLAB, Fortran, and C++ code online for download, the Second Edition of this very popular text: Includes a new chapter with two sections on the finite element method, two sections on shallow water waves, and two sections on the driven cavity problem Introduces multiprocessor/multicore computers, parallel MATLAB, and message passing interface (MPI) in the chapter on high-performance computing Updates and adds code and documentation *Computational Mathematics: Models, Methods, and Analysis with MATLAB® and MPI, Second Edition* is an ideal textbook for an undergraduate

course taught to mathematics, computer science, and engineering students. By using code in practical ways, students take their first steps toward more sophisticated numerical modeling.

Active Flow Control Rudibert King 2007-05-31 This book contains contributions presented at the Active Flow Control 2006 conference, held September 2006, at the Technische Universität Berlin, Germany. It contains a well balanced combination of theoretical and experimental state-of-the-art results of Active Flow Control. Coverage combines new developments in actuator technology, sensing, robust and optimal open- and closed-loop control and model reduction for control.

A Compendium of Partial Differential Equation Models William E. Schiesser 2009-03-16 Presents numerical methods and computer code in Matlab for the solution of ODEs and PDEs with detailed line-by-line discussion.

Matlab - Modelling, Programming and Simulations Emilson Pereira Leite 2010

I do like CFD, VOL.1, Second Edition Katate Masatsuka 2013

The Finite Volume Method in Computational Fluid Dynamics F. Moukalled 2015-08-13 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 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.

Progress in Industrial Mathematics at ECMI 2014 Giovanni Russo 2017-09-04 This book presents a collection of papers emphasizing applications of mathematical models and methods to real-world problems of relevance for industry, life science, environment, finance and so on. The biannual Conference of ECMI (the European Consortium of Mathematics in Industry) held in 2014 focused on various aspects of industrial and applied mathematics. The five main topics addressed at the conference were mathematical models in life science, material science and semiconductors, mathematical methods in the environment, design automation and industrial applications, and computational finance. Several other topics have been treated, such as, among others, optimization and inverse problems, education, numerical methods for stiff pdes, model reduction, imaging processing, multi physics simulation, mathematical models in textile industry. The conference, which brought together applied mathematicians and experts from industry, provided a unique opportunity to exchange ideas, problems and methodologies, bridging the gap between mathematics and industry and contributing to the advancement of science and technology. The conference has included a presentation of EU-Maths-In (European Network of Mathematics for Industry and Innovation), a recent joint initiative of ECMI and EMS. The proceedings from this conference represent a snapshot of the current activity

in industrial mathematics in Europe, and are highly relevant to anybody interested in the latest applications of mathematics to industrial problems.

Mathematical Introduction to Fluid Mechanics A. J. Chorin 2012-12-06 These notes are based on a one-quarter (i. e. very short) course in fluid mechanics taught in the Department of Mathematics of the University of California, Berkeley during the Spring of 1978. The goal of the course was not to provide an exhaustive account of fluid mechanics, nor to assess the engineering value of various approximation procedures. The goals were: (i) to present some of the basic ideas of fluid mechanics in a mathematically attractive manner (which does not mean "fully rigorous"); (ii) to present the physical background and motivation for some constructions which have been used in recent mathematical and numerical work on the Navier-Stokes equations and on hyperbolic systems; (iii) to interest some of the students in this beautiful and difficult subject. The notes are divided into three chapters. The first chapter contains an elementary derivation of the equations; the concept of vorticity is introduced at an early stage. The second chapter contains a discussion of potential flow, vortex motion, and boundary layers. A construction of boundary layers using vortex sheets and random walks is presented; it is hoped that it helps to clarify the ideas. The third chapter contains an analysis of one-dimensional gas flow, from a mildly modern point of view. Weak solutions, Riemann problems, Glimm's scheme, and combustion waves are discussed. The style is informal and no attempt was made to hide the authors' biases and interests.

Time-Domain Finite Element Methods for Maxwell's Equations in Metamaterials Jichun Li 2012-12-15 The purpose of this book is to provide an up-to-date introduction to the time-domain finite element methods for Maxwell's equations involving metamaterials. Since the first successful construction of a metamaterial with both negative permittivity and permeability in 2000, the study of metamaterials has attracted significant attention from researchers across many disciplines. Thanks to enormous efforts on the part of engineers and physicists, metamaterials present great potential applications in antenna and radar design, sub-wavelength imaging, and invisibility cloak design. Hence the efficient simulation of electromagnetic phenomena in metamaterials has become a very important issue and is the subject of this book, in which various metamaterial modeling equations are introduced and justified mathematically. The development and practical implementation of edge finite element methods for metamaterial Maxwell's equations are the main focus of the book. The book finishes with some interesting simulations such as backward wave propagation and time-domain cloaking with metamaterials.

Discontinuous Galerkin Methods for Solving Elliptic and Parabolic Equations Beatrice Riviere 2008-12-18 Focuses on three primal DG methods, covering both theory and computation, and providing the basic tools for analysis.

A First Course in Computational Fluid Dynamics H. Aref 2017-10-12 This book provides a broad coverage of computational fluid dynamics that will interest engineers, astrophysicists, mathematicians, oceanographers and ecologists.

Two-Phase Flow Cl Kleinstreuer 2003-05-23 This graduate text provides a unified treatment of the fundamental principles of two-phase flow and shows how to apply the principles to a variety of homogeneous mixture as well as separated liquid-liquid, gas-solid, liquid-solid, and gas-liquid flow problems, which may be steady or transient, laminar or turbulent. Each chapter contains several sample problems, which illustrate the outlined theory and provide approaches to

find simplified analytic descriptions of complex two-phase flow phenomena. This well-balanced introductory text will be suitable for advanced seniors and graduate students in mechanical, chemical, biomedical, nuclear, environmental and aerospace engineering, as well as in applied mathematics and the physical sciences. It will be a valuable reference for practicing engineers and scientists. A solutions manual is available to qualified instructors.

Solving ODEs with MATLAB Lawrence F. Shampine 2003-04-28 This book, first published in 2003, provides a concise but sound treatment of ODEs, including IVPs, BVPs, and DDEs.

MATLAB Guide to Finite Elements Peter I. Kattan 2010-05-13 later versions. In addition, the CD-ROM contains a complete solutions manual that includes detailed solutions to all the problems in the book. If the reader does not wish to consult these solutions, then a brief list of answers is provided in printed form at the end of the book.

I would like to thank my family members for their help and continued support without which this book would not have been possible. I would also like to acknowledge the help of the editor at Springer-Verlag (Dr. Thomas Ditzinger) for his assistance in bringing this book out in its present form. Finally, I would like to thank my brother, Nicola, for preparing most of the line drawings in both editions. In this edition, I am providing two email addresses for my readers to contact me (pkattan@tedata.net.jo and pkattan@lsu.edu). The old email address that appeared in the first edition was cancelled in 2004. December 2006 Peter I. Kattan Preface to the First Edition 3 This is a book for people who love finite elements and MATLAB. We will use the popular computer package MATLAB as a matrix calculator for doing finite element analysis. Problems will be solved mainly using MATLAB to carry out the tedious and lengthy matrix calculations in addition to some manual manipulations especially when applying the boundary conditions. In particular the steps of the finite element method are emphasized in this book. The reader will not find ready-made MATLAB programs for use as black boxes. Instead step-by-step solutions of finite element problems are examined in detail using MATLAB.

Solving PDEs in Python Hans Petter Langtangen 2017-03-21 This book offers a concise and gentle introduction to finite element programming in Python based on the popular FEniCS software library. Using a series of examples, including the Poisson equation, the equations of linear elasticity, the incompressible Navier-Stokes equations, and systems of nonlinear advection-diffusion-reaction equations, it guides readers through the essential steps to quickly solving a PDE in FEniCS, such as how to define a finite variational problem, how to set boundary conditions, how to solve linear and nonlinear systems, and how to visualize solutions and structure finite element Python programs. This book is open access under a CC BY license.

Micro and Nanofluid Convection with Magnetic Field Effects for Heat and Mass Transfer Applications using MATLAB® Chakravarthula Raju 2022-06-14 Micro and Nanofluid Convection with Magnetic Field Effects for Heat and Mass Transfer Applications using MATLAB® examines the performance of micro and nanofluids with various physical effects such as magnetic field, slip effects, radiation and heat sources. Heat and mass transfer enhancement techniques are widely used in many applications in the heating and cooling or freezing process to make possible a reduction in weight and size or enhance performance during heat and mass exchanges. The book covers the two categories of flow techniques, active and passive. It discusses various considerations in the engineering sciences in

the melting process, polymer industry and in metallurgy. To be more precise, it may be pointed out that many metal surgical developments involve the cooling of continuous strips or filaments by drawing them through a quiescent fluid, and in that process of drawing, these strips are sometimes stretched. In all these cases, the properties of the final product depend, to a great extent, on the rate of cooling by drawing such strips in an electrically conducting fluid subject to a magnetic field and thermal radiation. Provides information about the governing equations for all three types of flow geometries Explains micro polar fluid flow modeling Offers detailed coverage of boundary value problems using MATLAB®

Applied Optimization with MATLAB Programming P. Venkataraman 2009-03-23
Technology/Engineering/Mechanical Provides all the tools needed to begin solving optimization problems using MATLAB® The Second Edition of *Applied Optimization with MATLAB® Programming* enables readers to harness all the features of MATLAB® to solve optimization problems using a variety of linear and nonlinear design optimization techniques. By breaking down complex mathematical concepts into simple ideas and offering plenty of easy-to-follow examples, this text is an ideal introduction to the field. Examples come from all engineering disciplines as well as science, economics, operations research, and mathematics, helping readers understand how to apply optimization techniques to solve actual problems. This Second Edition has been thoroughly revised, incorporating current optimization techniques as well as the improved MATLAB® tools. Two important new features of the text are: Introduction to the scan and zoom method, providing a simple, effective technique that works for unconstrained, constrained, and global optimization problems New chapter, Hybrid Mathematics: An Application, using examples to illustrate how optimization can develop analytical or explicit solutions to differential systems and data-fitting problems Each chapter ends with a set of problems that give readers an opportunity to put their new skills into practice. Almost all of the numerical techniques covered in the text are supported by MATLAB® code, which readers can download on the text's companion Web site www.wiley.com/go/venkat2e and use to begin solving problems on their own. This text is recommended for upper-level undergraduate and graduate students in all areas of engineering as well as other disciplines that use optimization techniques to solve design problems.