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Process Control Process Modelling, Identification, and Control Chaos Modeling and Control Systems Design Modeling and Control of Engines and Drivelines Modeling and Control of Engineering Systems Efficient Modeling and Control of Large-Scale Systems Modeling and Control of Batch Processes Fuzzy Modeling for Control Fractional Order Systems Modeling and Control of Antennas and Telescopes Introduction to Modeling and Control of Internal Combustion Engine Systems Modeling and Control of Precision Actuators Intelligent Systems Modeling and Control of Discrete-event Dynamic Systems Power Electronic Converters Modeling and Control Introduction to Control Engineering Modeling and Control in the Biomedical Sciences Techniques of Model-based Control Modeling and Control of Complex Systems Large-scale Systems Fundamentals in Modeling and Control of Mobile Manipulators Fuzzy Modeling and Control Modeling and Control of Hydrosystems Process Dynamics and Control Robot Modeling and Control Fractional Order Systems System Modelling and Control Dynamic Systems Modeling and Control of Complex Physical Systems Process Modeling, Simulation, and Control for Chemical Engineers Introduction to Hybrid Vehicle System Modeling and Control Modeling and Control for Micro/nano Devices and Systems Modeling and Advanced Control for Process Industries Gas Turbines Modeling, Simulation, and Control Dynamics of Underactuated Multibody Systems Fuel Cells Modeling and Control of Discrete-event Dynamic Systems New Approaches to Fuzzy Modeling and Control Advanced Dynamics Modeling, Duality and Control of Robotic Systems Modeling, Analysis, and Control of Dynamic Systems

Process Control *2003*

master process control hands on through practical examples and matlab r simulations this is the first complete introduction to process control that fully integrates software tools enabling professionals and students to master critical techniques hands on through computer simulations based on the popular matlab environment process control modeling design and simulation teaches the field s most important techniques behaviors and control problems through practical examples supplemented by extensive exercises with detailed derivations relevant software files and additional techniques available on a companion site coverage includes fundamentals of process control and instrumentation including objectives variables and block diagrams methodologies for developing dynamic models of chemical processes dynamic behavior of linear systems state space models transfer function based models and more feedback control proportional integral and derivative pid controllers and closed loop stability analysis frequency response analysis techniques for evaluating the robustness of control systems improving control loop performance internal model control imc automatic tuning gain scheduling and enhancements to improve disturbance rejection split range selective and override strategies for switching among inputs or outputs control loop interactions and multivariable controllers an introduction to model predictive control mpc bequette walks step by step through the development of control instrumentation diagrams for an entire chemical process reviewing common control strategies for individual unit operations then discussing strategies for integrated systems the book also includes 16 learning modules demonstrating how to use matlab and simulink to solve several key control problems ranging from robustness analyses to biochemical reactors biomedical problems to multivariable control

Process Modelling, Identification, and Control *2007-06-30*

this compact and original reference and textbook presents the most important classical and modern essentials of control engineering in a single volume it constitutes a harmonic mixture of control theory and applications which makes the book especially useful for students practicing engineers and researchers interested in modeling and control of processes well written and easily understandable it includes a range of methods for the analysis and design of control systems

Chaos Modeling and Control Systems Design *2014-12-03*

the development of computational intelligence ci systems was inspired by observable and imitable aspects of intelligent activity of human being and nature the essence of the systems based on computational intelligence is to process and interpret data of various nature so that that ci is strictly connected with the increase of available data as well as capabilities of their processing mutually supportive factors developed theories of computational intelligence were quickly applied in many fields of engineering data analysis forecasting biomedicine and others they are used in images and sounds processing and identifying signals processing multidimensional data visualization steering of objects analysis of lexicographic data requesting systems in banking diagnostic systems expert systems and many other practical implementations this book consists of 15 contributed chapters by subject experts who are specialized in the various topics addressed in this book the special chapters have been brought out in the broad areas of control systems power electronics computer science information technology modeling and engineering applications special importance was given to chapters offering practical solutions and novel methods for the recent research problems in the main areas of this book viz control systems modeling computer science it and engineering applications this book will serve as a reference book for graduate students and researchers with a basic knowledge of control theory computer science and soft computing techniques the resulting design procedures are emphasized using matlab simulink software

Modeling and Control of Engines and Drivelines *2014-04-07*

control systems have come to play an important role in the performance of modern vehicles with regards to meeting goals on low emissions and low fuel consumption to achieve these goals modeling simulation and analysis have become standard tools for the development of control systems in the automotive industry modeling and control of engines and drivelines provides an up to date treatment of the topic from a clear perspective of systems engineering and control systems which are at the core of vehicle design this book has three main goals the first is to provide a thorough understanding of component models as building blocks it has therefore been important to provide measurements from real processes to explain the underlying physics to describe the modeling considerations and to validate the resulting models experimentally second the authors show how the models are used in the current design of control and diagnosis systems these system designs are never used in isolation so

the third goal is to provide a complete setting for system integration and evaluation including complete vehicle models together with actual requirements and driving cycle analysis key features covers signals systems and control in modern vehicles covers the basic dynamics of internal combustion engines and drivelines provides a set of standard models and includes examples and case studies covers turbo and super charging and automotive dependability and diagnosis accompanied by a web site hosting example models and problems and solutions modeling and control of engines and drivelines is a comprehensive reference for graduate students and the authors close collaboration with the automotive industry ensures that the knowledge and skills that practicing engineers need when analysing and developing new powertrain systems are also covered

Modeling and Control of Engineering Systems *2009-08-05*

proper control of any part of an engineering system requires an overall understanding of the system this volume provides engineers with an accessible introduction to the modeling analysis control instrumentation and design of engineering systems it presents a wide range of analytical techniques computer tools instrumentation details and design methods it also addresses important aspects of laboratory instrumentation and provides practical applications of various models a special chapter is devoted to control system instrumentation pub desc

Efficient Modeling and Control of Large-Scale Systems *2010-06-23*

complexity and dynamic order of controlled engineering systems is constantly increasing complex large scale systems where large reflects the system s order and not necessarily its physical size appear in many engineering fields such as micro electromechanics manufacturing aerospace civil engineering and power engineering modeling of these systems often result in very high order models imposing great challenges to the analysis design and control problems efficient modeling and control of large scale systems compiles state of the art contributions on recent analytical and computational methods for addressing model reduction performance analysis and feedback control design for such systems also addressed at length are new theoretical developments novel computational approaches and illustrative applications to various fields along with an interdisciplinary focus emphasizing methods and approaches that can be commonly applied in various engineering fields examinations of applications in various fields including micro electromechanical systems mems manufacturing processes power networks traffic control efficient modeling and control of large scale systems is an ideal volume for engineers and researchers working in the fields of control and dynamic systems

Modeling and Control of Batch Processes *2018-11-28*

modeling and control of batch processes presents state of the art techniques ranging from mechanistic to data driven models these methods are specifically tailored to handle issues pertinent to batch processes such as nonlinear dynamics and lack of online quality measurements in particular the book proposes a novel batch control design with well characterized feasibility properties a modeling approach that unites multi model and partial least squares techniques a generalization of the subspace identification approach for batch processes and applications to several detailed case studies ranging from a complex simulation test bed to industrial data the book s proposed methodology employs statistical tools such as partial least squares and subspace identification and couples them with notions from state space based models to provide solutions to the quality control problem for batch processes practical implementation issues are discussed to help readers understand the application of the methods in greater depth the book includes numerous comments and remarks providing insight and fundamental understanding into the modeling and control of batch processes modeling and control of batch processes includes many detailed examples of industrial relevance that can be tailored by process control engineers or researchers to a specific application the book is also of interest to graduate students studying control systems as it contains new research topics and references to significant recent work advances in industrial control reports and encourages the transfer of technology in control engineering the rapid development of control technology has an impact on all areas of the control discipline the series offers an opportunity for researchers to present an extended exposition of new work in all aspects of industrial control

Fuzzy Modeling for Control *2012-12-06*

rule based fuzzy modeling has been recognised as a powerful technique for the modeling of partly known nonlinear systems fuzzy models can effectively integrate information from different sources such

as physical laws empirical models measurements and heuristics application areas of fuzzy models include prediction decision support system analysis control design etc fuzzy modeling for control addresses fuzzy modeling from the systems and control engineering points of view it focuses on the selection of appropriate model structures on the acquisition of dynamic fuzzy models from process measurements fuzzy identification and on the design of nonlinear controllers based on fuzzy models to automatically generate fuzzy models from measurements a comprehensive methodology is developed which employs fuzzy clustering techniques to partition the available data into subsets characterized by locally linear behaviour the relationships between the presented identification method and linear regression are exploited allowing for the combination of fuzzy logic techniques with standard system identification tools attention is paid to the trade off between the accuracy and transparency of the obtained fuzzy models control design based on a fuzzy model of a nonlinear dynamic process is addressed using the concepts of model based predictive control and internal model control with an inverted fuzzy model to this end methods to exactly invert specific types of fuzzy models are presented in the context of predictive control branch and bound optimization is applied the main features of the presented techniques are illustrated by means of simple examples in addition three real world applications are described finally software tools for building fuzzy models from measurements are available from the author

Fractional Order Systems *2008-07-11*

mechanical engineering and engineering discipline born of the needs of the industrial revolution is once again asked to do its substantial share in the call for industrial renewal the general call is urgent as we face profound issues of productivity and competitiveness that require engineering solutions among others the mechanical engineering series is a series featuring graduate texts and research monographs intended to address the need for information in contemporary areas of mechanical engineering the series is conceived as a comprehensive one that covers a broad range of c centrations important to mechanical engineering graduate education and research we are fortunate to have a distinguished roster of series editors each an expert in one of the areas of concentration the names of the series editors are listed on page vi of this volume the areas of concentration are applied mechanics biomechanics computational mechanics dynamic systems and control energetics mechanics of materials processing thermal science and tribology preface this book is based on my experience with the control systems of antennas and radiotelescopes overwhelmingly it is based on experience with the nasa deep space network dsn antennas it includes modeling the antennas developing control algorithms eld testing system identi cation performance evaluation and 1 troubleshooting my previous book emphasized the theoretical aspects of antenna control engineering while this one describes the application part of the antenna control engineering

Modeling and Control of Antennas and Telescopes *2014-03-12*

internal combustion engines still have a potential for substantial improvements particularly with regard to fuel efficiency and environmental compatibility these goals can be achieved with help of control systems modeling and control of internal combustion engines ice addresses these issues by offering an introduction to cost effective model based control system design for ice the primary emphasis is put on the ice and its auxiliary devices mathematical models for these processes are developed in the text and selected feedforward and feedback control problems are discussed the appendix contains a summary of the most important controller analysis and design methods and a case study that analyzes a simplified idle speed control problem the book is written for students interested in the design of classical and novel ice control systems

Introduction to Modeling and Control of Internal Combustion Engine Systems 2018-10-08

modeling and control of precision actuators explores new technologies that can ultimately be applied in a myriad of industries it covers dynamical analysis of precise actuators and strategies of design for various control applications the book addresses four main schemes modeling and control of precise actuators nonlinear control of precise actuators including sliding mode control and neural network feedback control fault detection and fault tolerant control and advanced air bearing control it covers application issues in the modeling and control of precise actuators providing several interesting case studies for more application oriented readers introduces the driving forces behind precise actuators describes nonlinear dynamics of precise actuators and their mathematical forms including hysteresis creep friction and force ripples presents the control strategies for precise actuators based on preisach model as well as creep dynamics develops relay feedback techniques for identifying nonlinearities such as friction and force ripples discusses a mpc approach based on piecewise affine models which emulate the frictional effects in the precise actuator covers the concepts of air bearing stages with the corresponding control method provides a set of schemes suitable for fault detection and accommodation control of mechanical systems emphasizing design theory and control strategies the book

includes simulation and practical examples for each chapter covers precise actuators such as piezo motors coil motors air bearing motors and linear motors discusses integration among different technologies and includes three case studies in real projects the book concludes by linking design methods and their applications emphasizing the key issues involved and how to implement the precision motion control tasks in a practical system it provides a concise and comprehensive source of the state of the art developments and results for modeling and control of precise actuators

Modeling and Control of Precision Actuators 2017-12-19

providing a thorough introduction to the field of soft computing techniques intelligent systems modeling optimization and control covers every major technique in artificial intelligence in a clear and practical style this book highlights current research and applications addresses issues encountered in the development of applied systems and describes a wide range of intelligent systems techniques including neural networks fuzzy logic evolutionary strategy and genetic algorithms the book demonstrates concepts through simulation examples and practical experimental results case studies are also presented from each field to facilitate understanding

Intelligent Systems *2007-08-17*

discrete event dynamic systems deds permeate our world they are of great importance in modern manufacturing processes transportation and various forms of computer and communications networking this book begins with the mathematical basics required for the study of deds and moves on to present various tools used in their modeling and control industrial examples illustrate the concepts and methods discussed making this book an invaluable aid for students embarking on further courses in control manufacturing engineering or computer studies

Modeling and Control of Discrete-event Dynamic Systems *2013-11-12*

modern power electronic converters are involved in a very broad spectrum of applications switched mode power supplies electrical machine motion control active power filters distributed power generation flexible ac transmission systems renewable energy conversion systems and vehicular technology among them power electronics converters modeling and control teaches the reader how to analyze and model the behavior of converters and so to improve their design and control dealing with a set of confirmed algorithms specifically developed for use with power converters this text is in two parts models and control methods the first is a detailed exposition of the most usual power converter models switched and averaged models small large signal models and time frequency models the second focuses on three groups of control methods linear control approaches normally associated with power converters resonant controllers because of their significance in grid connected applications and nonlinear control methods including feedback linearization stabilizing passivity based and variable structure control extensive case study illustration and end of chapter exercises reinforce the study material power electronics converters modeling and control addresses the needs of graduate students interested in power electronics providing a balanced understanding of theoretical ideas coupled with pragmatic tools based on control engineering practice in the field academics teaching power electronics will find this an attractive course text and the practical points make the book useful for self tuition by engineers and other practitioners wishing to bring their knowledge up to date

Power Electronic Converters Modeling and Control *2006*

the text is written from the engineer s point of view to explain the basic oncepts involved in feedback control theory the material in the text has been organized for gradual and sequential development of control theory starting with a statement of the task of a control engineer at the very outset the book is tended for an introductory undergraduate course in control systems for engineering students this text presents a comprehensive analysis and design of continuous time control systems and includes more than introductory material for discrete systems with adequate guidelines to extend the results derived in connection continuous time systems the prerequisite for the reader is some elementary owledge of differential equations vector matrix analysis and mechanics transfer function and state variable models of typical components and subsystems have been derived in the appendix at the end of the book most of the materials including solved and unsolved problems presented in the book have been class tested in senior undergraduates and first year graduate el courses in the field of control systems at the electronics and telecommunication engineering department jadavpur university matlab is the most widely used cad software package in universities throughout the world some representative matlab scripts used for solving problems are included at the end of each chapter the detailed

design steps of fuzzy logic based controller using simulink and matlab has been provided in the book to give the student a head start in this emerging discipline a chapter has been included to deal with nonlinear components and their analysis g matlab and simulink through user defined s functions finally a chapter has been included to deal with the implementation of digital controllers on finite bit computer to bring out the problems associated with digital trollers in view of extensive use of matlab for rapid verification of controller designs some notes for using matlab script m files and function m files are included at the end of the book

Introduction to Control Engineering *1975-09-01*

annotation in this book two of the field s leading experts bring together powerful advances in model based control for chemical process engineering from start to finish coleman brosilow and babu joseph introduce practical approaches designed to solve real world problems not just theory the book contains extensive examples and exercises and an accompanying cd rom contains hands on matlab files that supplement the examples and help readers solve the exercises a feature found in no other book on the topic

Modeling and Control in the Biomedical Sciences 2002

comprehension of complex systems comes from an understanding of not only the behavior of constituent elements but how they act together to form the behavior of the whole however given the multidisciplinary nature of complex systems the scattering of information across different areas creates a chaotic situation for those trying to understand possible solutions and applications modeling and control of complex systems brings together a number of research experts to present some of their latest approaches and future research directions in a language accessible to system theorists contributors discuss complex systems such as networks for modeling and control of civil structures vehicles robots biomedical systems fluid flow systems and home automation systems each chapter provides theoretical and methodological descriptions of a specific application in the control of complex systems including congestion control in computer networks autonomous multi robot docking systems modeling and control in cancer genomics and backstepping controllers for stabilization of turbulent flow pdes with this unique reference you will discover how complexity is dealt with in different disciplines and learn about the latest methodologies which are applicable to your own specialty the balanced mix of theory and simulation presented by modeling and control of complex systems supplies a strong vehicle for enlarging your knowledge base a fueling future advances and incredible breakthroughs

Techniques of Model-based Control *2007-12-26*

large complex systems such as power plants and chemical manufacturing plants depend on automatic control systems for safe operation this book a fully updated revision of a successful work introduces the principles of neural nets and fuzzy logic as they apply to designing large scale control systems

Modeling and Control of Complex Systems 1997

mobile manipulators combine the advantages of mobile platforms and robotic arms extending their operational range and functionality to large spaces and remote demanding and or dangerous environments they also bring complexity and difficulty in dynamic modeling and control system design however advances in nonlinear system analysis and control system design offer powerful tools and concepts for the control of mobile manipulator systems fundamentals in modeling and control of mobile manipulators presents a thorough theoretical treatment of several fundamental problems for mobile robotic manipulators the book integrates fresh concepts and state of the art results to systematically examine kinematics and dynamics motion generation feedback control coordination and cooperation from this treatment the authors form a basic theoretical framework for a mobile robotic manipulator that extends the theory of nonlinear control and applies to more realistic problems drawing on their research over the past ten years the authors propose novel control theory concepts and techniques to tackle key problems topics covered include kinematic and dynamic modeling control of nonholonomic systems path planning that considers motion and manipulation hybrid motion force control and hybrid position force control where the mobile manipulator is required to interact with environments and coordination and cooperation strategies for multiple mobile manipulators the book also includes practical examples of applications in engineering systems this timely book investigates important scientific and engineering issues for researchers and engineers working with either single or multiple mobile manipulators for large operational spaces better cooperation and

improved productivity

Large-scale Systems *2017-03-30*

open channel hydraulics are described by hyperbolic equations derived from laws of conservation of mass and momentum called saint venant equations in conjunction with hydraulic structure equations these are used to represent the dynamic behavior of water flowing in rivers irrigation canals and sewers building on a detailed analysis of open channel flow modeling this monograph constructs control design methodologies based on a frequency domain approach in practice many open channel systems are controlled with classical input output controllers that are usually poorly tuned the approach of this book fashioning pragmatic engineering solutions for the control of open channels is given rigorous mathematical justification once the control objectives are clarified a generic control design method is proposed first for a canal pool and then for a whole canal the methods developed in the book have been validated on several canals of various dimensions up to a large scale irrigation canal

Fundamentals in Modeling and Control of Mobile Manipulators *2014-09-30*

offering a different approach to other textbooks in the area this book is a comprehensive introduction to the subject divided in three broad parts the first part deals with building physical models the second part with developing empirical models and the final part discusses developing process control solutions theory is discussed where needed to ensure students have a full understanding of key techniques that are used to solve a modeling problem hallmark features includes worked out examples of processes where the theory learned early on in the text can be applied uses matlab simulation examples of all processes and modeling techniques further information on matlab can be obtained from mathworks com includes supplementary website to include further references worked examples and figures from the book this book is structured and aimed at upper level undergraduate students within chemical engineering and other engineering disciplines looking for a comprehensive introduction to the subject it is also of use to practitioners of process control where the integrated approach of physical and empirical modeling is particularly valuable

Fuzzy Modeling and Control *2009-09-17*

the coverage is unparalleled in both depth and breadth no other text that i have seen offers a better complete overview of modern robotic manipulation and robot control bradley bishop united states naval academy based on the highly successful classic robot dynamics and control by spong and vidyasagar wiley 1989 robot modeling and control offers a thoroughly up to date self contained introduction to the field the text presents basic and advanced material in a style that is at once readable and mathematically rigorous key features a step by step computational approach helps you derive and compute the forward kinematics inverse kinematics and jacobians for the most common robot designs detailed coverage of vision and visual servo control enables you to program robots to manipulate objects sensed by cameras an entire chapter on dynamics prepares you to compute the dynamics of the most common manipulator designs the most common motion planning and trajectory generation algorithms are presented in an elementary style the comprehensive treatment of motion and force control includes both basic and advanced methods the text s treatment of geometric nonlinear control is more readable than in more advanced texts many worked examples and an extensive list of problems illustrate all aspects of the theory about the authors mark w spong is donald biggar willett professor of engineering at the university of illinois at urbana champaign dr spong is the 2005 president of the ieee control systems society and past editor in chief of the ieee transactions on control systems technology seth hutchinson is currently a professor at the university of illinois in urbana champaign and a senior editor of the ieee transactions on robotics and automation he has published extensively on the topics of robotics and computer vision mathukumalli vidyasagar is currently executive vice president in charge of advanced technology at tata consultancy services tcs india s largest it firm dr vidyasagar was formerly the director of the centre for artificial intelligence and robotics cair under government of india s ministry of defense

Modeling and Control of Hydrosystems *2007-01-02*

this book aims to propose implementations and applications of fractional order systems fos it is well known that fos can be applied in control applications and systems modeling and their effectiveness has been proven in many theoretical works and simulation routines a further and mandatory step for fos real world utilization is their hardware implementation and applications on real systems modeling with this viewpoint introductive chapters on fos are included on the definition of stability region of fractional order pid controller and characteristics followed by the practical implementation based on

microcontroller field programmable gate array field programmable analog array and switched capacitor another section is dedicated to fo modeling of ionic polymeric metal composite ipmc this new material may have applications in robotics aerospace and biomedicine

Process Dynamics and Control 2005-11-18

craig kluever s dynamic systems modeling simulation and control highlights essential topics such as analysis design and control of physical engineering systems often composed of interacting mechanical electrical and fluid subsystem components the 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

Robot Modeling and Control *2010*

energy exchange is a major foundation of the dynamics of physical systems and hence in the study of complex multi domain systems methodologies that explicitly describe the topology of energy exchanges are instrumental in structuring the modeling and the computation of the system s dynamics and its control this book is the outcome of the european project geoplex fp5 ist 2001 34166 that studied and extended such system modeling and control methodologies this unique book starts from the basic concept of port based modeling and extends it to port hamiltonian systems this generic paradigm is applied to various physical domains showing its power and unifying flexibility for real multi domain systems

Fractional Order Systems *1978*

the purpose of this book is to convey to undergraduate students an understanding of those areas of process control that all chemical engineers need to know the presentation is concise readable and restricted to only essential elements the methods presented have been successfully applied in industry to solve real problems analysis of closedloop dynamics in the time laplace frequency and sample data domains are covered designing simple regulatory control systems for multivariable processes is discussed the practical aspects of process control are presented sizing control valves tuning controllers developing control structures and considering interaction between plant design and control practical simple identification methods are covered

System Modelling and Control *2015-04-06*

this is an engineering reference book on hybrid vehicle system analysis and design an outgrowth of the author s substantial work in research development and production at the national research council canada azure dynamics and now general motors it is an irreplaceable tool for helping engineers develop algorithms and gain a thorough understanding of hybrid vehicle systems this book covers all the major aspects of hybrid vehicle modeling control simulation performance analysis and preliminary design it not only systemically provides the basic knowledge of hybrid vehicle system configuration and main components but also details their characteristics and mathematic models provides valuable technical expertise necessary for building hybrid vehicle system and analyzing performance via drivability fuel economy and emissions built from the author s industry experience at major vehicle companies including general motors and azure dynamics inc offers algorithm implementations and figures examples extracted from actual practice systems suitable for a training course on hybrid vehicle system development with supplemental materials an essential resource enabling hybrid development and design engineers to understand the hybrid vehicle systems necessary for control algorithm design and developments

Dynamic Systems *2014-11-14*

micro nano scale engineering especially the design and implementation of ultra fast and ultra scale energy devices sensors and cellular and molecular systems remains a daunting challenge modeling and control has played an essential role in many technological breakthroughs throughout the course of history therefore the need for a practical guide to modeling and control for micro nano scale

devices and systems has emerged the first edited volume to address this rapidly growing field modeling and control for micro nano devices and systems gives control engineers lab managers high tech res

Modeling and Control of Complex Physical Systems *1990*

due to the complexity of the process operation and the requirements for high quality low cost safety and the protection of the environment an increasing number of pulp and paper companies are in need of an advanced control technology to improve their process operation this publication presents for the first time the theory of such an advanced control technology as well as various industrial applications associated especially with paper making the reader will gain a better understanding of the most popular and advanced process control techniques and applications of these techniques in an important real time process industry the contents are based on the authors own research on modeling and advanced control in this field

Process Modeling, Simulation, and Control for Chemical Engineers *2013-02-08*

gas turbines modeling simulation and control using artificial neural networks provides new approaches and novel solutions to the modeling simulation and control of gas turbines gts using artificial neural networks anns after delivering a brief introduction to gt performance and classification the book outlines important criteria to consider at the beginning of the gt modeling process such as gt types and configurations control system types and configurations and modeling methods and objectives highlights research in the fields of white box and black box modeling simulation and control of gts exploring models of low power gts industrial power plant gas turbines ipgts and aero gts discusses the structure of anns and the ann based model building process including system analysis data acquisition and preparation network architecture and network training and validation presents a noteworthy ann based methodology for offline system identification of gts complete with validated models using both simulated and real operational data covers the modeling of gt transient behavior and start up operation and the design of proportional integral derivative pid and neural network based controllers gas turbines modeling simulation and control using artificial neural networks not only offers a comprehensive review of the state of the art of gas turbine modeling and intelligent techniques but also demonstrates how artificial intelligence can be used to solve complicated industrial problems specifically in the area of gts

Introduction to Hybrid Vehicle System Modeling and Control 2014

underactuated multibody systems are intriguing mechatronic systems as they posses fewer control inputs than degrees of freedom some examples are modern light weight flexible robots and articulated manipulators with passive joints this book investigates such underactuated multibody systems from an integrated perspective this includes all major steps from the modeling of rigid and flexible multibody systems through nonlinear control theory to optimal system design the underlying theories and techniques from these different fields are presented using a self contained and unified approach and notation system subsequently the book focuses on applications to large multibody systems with multiple degrees of freedom which require a combination of symbolical and numerical procedures finally an integrated optimization based design procedure is proposed whereby both structural and control design are considered concurrently each chapter is supplemented by illustrated examples

Modeling and Control for Micro/nano Devices and Systems 2013-03-07

fuel cells modeling control and applications describes advanced research results on modeling and control designs for fuel cells and their hybrid energy systems filled with simulation examples and test results it provides detailed discussions on fuel cell modeling analysis and nonlinear control the book begins with an introduction to fuel cells and fuel cell power systems as well as the fundamentals of fuel cell systems and their components it then presents the linear and nonlinear modeling of fuel cell dynamics before discussing typical approaches of linear and nonlinear modeling and control design methods for fuel cells the authors also explore the simulink implementation of fuel cells including the modeling of pem fuel cells and control designs they cover the applications of fuel cells in vehicles utility power systems stand alone systems and hybrid renewable energy systems the book concludes with the modeling and analysis of hybrid renewable energy systems which integrate fuel cells wind power and solar power mathematical preliminaries on linear and nonlinear control are provided in an appendix with the need for alternative power well established we are seeing unprecedented research in fuel cell technology written by scientists directly involved with the research this book presents approaches and achievements in the linear and nonlinear modeling and control design of pem fuel cells

Modeling and Advanced Control for Process Industries *2015-10-16*

discrete event dynamic systems deds permeate our world they are of great importance in modern manufacturing processes transportation and various forms of computer and communications networking this book begins with the mathematical basics required for the study of deds and moves on to present various tools used in their modeling and control industrial examples illustrate the concepts and methods discussed making this book an invaluable aid for students embarking on further courses in control manufacturing engineering or computer studies

Gas Turbines Modeling, Simulation, and Control *2016-08-23*

fuzzy logic has found applications in an incredibly wide range of areas in the relatively wide range of areas in the relatively short time since its conception it was invented by lotfi zadeh a leading systems expert so it is perhaps not surprising that system theory is one of the areas in which fuzzy logic has made a profound impact fuzzy logic combined with the paradigm of computing with words allows the use and manipulation of human knowledge and reasoning in the modeling and control of dynamical systems this monograph presents new approaches to the construction of fuzzy models and to the design of fuzzy controllers the emphasis is on developing methods that allow systematic design on the one hand and mathematical analysis of the resulting system on the other in particular the methods described allow rigorous analysis of the stability and robustness of the systems which are crucial issues in control theory the first theme of the book is a new approach to the system design and analysis of fuzzy controllers given linguistic information concerning the plant and the control objective the new approach fuzzy lyapunov synthesis is a computing with words version of the well known classical lyapunov synthesis method the second theme of the book is to show that fuzzy controllers are in fact solutions to a nonlinear optimal control problem the authors formulate a novel nonlinear optimal control problem consisting of a new state space model referred to as the hyperbolic state space model and a new cost functional and show that its solution is a fuzzy controller this leads to a new framework for fuzzy modeling and control that combines the advantages of the fuzzyworld such as linguistic interpretability and of classical optimal control theory such as guaranteed stability and robustness

Dynamics of Underactuated Multibody Systems *2017-12-19*

this book provides detailed fundamental theoretical reviews and preparations necessary for developing advanced dynamics modeling and control strategies for various types of robotic systems this research book specifically addresses and discusses the uniqueness issue of representing orientation or rotation and further proposes an innovative isometric embedding approach the novel approach can not only reduce the dynamic formulation for robotic systems into a compact form but it also offers a new way to realize the orientational trajectory tracking control procedures in addition the book gives a comprehensive introduction to fundamentals of mathematics and physics that are required for modeling robot dynamics and developing effective control algorithms many computer simulations and realistic 3d animations to verify the new theories and algorithms are included in the book as well it also presents and discusses the principle of duality involved in robot kinematics statics and dynamics the duality principle can guide the dynamics modeling and analysis into a right direction for a variety of robotic systems in different types from open serial chain to closed parallel chain mechanisms it intends to serve as a diversified research reference to a wide range of audience including undergraduate juniors and seniors graduate students researchers and engineers interested in the areas of robotics control and applications

Fuel Cells 2009-10-12

an integrated presentation of both classical and modern methods of systems modeling response and control includes coverage of digital control systems details sample data systems and digital control provides numerical methods for the solution of differential equations gives in depth information on the modeling of physical systems and central hardware

Modeling and Control of Discrete-event Dynamic Systems ***2000***

New Approaches to Fuzzy Modeling and Control 2021-09-23

Advanced Dynamics Modeling, Duality and Control of Robotic Systems 1983-01-28

Modeling, Analysis, and Control of Dynamic Systems

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