

Robot Modeling And Control

An Introduction to System Modeling and Control
Techniques of Model-based Control
Modeling and Control of Engineering Systems
Process Dynamics, Modeling, and Control
Modeling and Control of Complex Systems
Modeling and Simulation for Automatic Control
Modeling and Control of Precision Actuators
Introduction to Modeling and Control of Internal Combustion Engine Systems
Efficient Modeling and Control of Large-Scale Systems
Modeling, Analysis and Control of Centralized and Decentralized Logical Discrete-event Systems
Real-time Control and Optimization of Curing in Thick Sectioned Thermoset Composites
Fractional-order Modeling and Control of Dynamic Systems
Modeling and μ -synthesis
Robust Control of Flexible Manipulators
Real Time Modeling, Simulation and Control of Dynamical Systems
Introduction to Control Engineering
Modeling, Control, and Optimization of Natural Gas Processing Plants
Modeling and Control of Vibration in Mechanical Systems
TP-Model Transformation-Based-Control Design Frameworks
Modeling and Simulation
Modeling and Control of AC Machine Using MATLAB/SIMULINK
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a practical and straightforward exploration of the basic tools for the modeling analysis and design of control

systems in an introduction to system modeling and control dr chiasson delivers an accessible and intuitive guide to understanding modeling and control for students in electrical mechanical and aerospace aeronautical engineering the book begins with an introduction to the need for control by describing how an aircraft flies complete with figures illustrating roll pitch and yaw control using its ailerons elevators and rudder respectively the book moves on to rigid body dynamics about a single axis gears cart rolling down an incline and then to modeling dc motors dc tachometers and optical encoders using the transfer function representation of these dynamic models pid controllers are introduced as an effective way to track step inputs and reject constant disturbances it is further shown how any transfer function model can be stabilized using output pole placement and on how two degree of freedom controllers can be used to eliminate overshoot in step responses bode and nyquist theory are then presented with an emphasis on how they give a quantitative insight into a control system s robustness and sensitivity an introduction to system modeling and control closes with chapters on modeling an inverted pendulum and a magnetic levitation system trajectory tracking control using state feedback and state estimation in addition the book offers a complete set of matlab simulink files for examples and problems included in the book a set of lecture slides for each chapter a solutions manual with recommended problems to assign an analysis of the robustness and sensitivity of four different controller designs for an inverted pendulum cart pole perfect for electrical mechanical and aerospace aeronautical engineering students an introduction to system modeling and control will also be an invaluable addition to the libraries of practicing engineers

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

developed from the author s academic and industrial experiences modeling and control of engineering systems provides a unified treatment of the modeling of mechanical electrical fluid and thermal systems and then systematically covers conventional advanced and intelligent control instrumentation experimentation and design it includes the

this text offers a modern view of process control in the context of today s technology it provides the standard material in a coherent presentation and uses a notation that is more consistent with the research literature in process control topics that are unique include a unified approach to model representations process model formation and process identification multivariable control statistical quality control and model based control this book is designed to be used as an introductory text for undergraduate courses in process dynamics and control in addition to chemical engineering courses the text would also be suitable for such courses taught in mechanical nuclear industrial and metallurgical engineering departments the material is organized so that modern concepts are presented to the student but details of the most advanced material

are left to later chapters the text material has been developed refined and classroom tested over the last 10 15 years at the university of wisconsin and more recently at the university of delaware as part of the course at wisconsin a laboratory has been developed to allow the students hands on experience with measurement instruments real time computers and experimental process dynamics and control problems

there is an emerging interest in the area of modeling and control of complex systems for applications in many engineering and non engineering fields such as biology transportation robotics information technology and communications this text provides a pioneering single source compilation of material from internationally renowned experts with different approaches to the applications of modeling and control of complex systems sections cover complex systems biological systems communication networks sensor networks and automation autonomous vehicles and robotics transportation systems and structures and others the authors highlight the most important areas of research the latest advances and possible future directions

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

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

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

this book reports on an outstanding research devoted to modeling and control of dynamic systems using fractional order calculus it describes the development of model based control design methods for systems described by fractional dynamic models more than 300 years had passed since newton and leibniz developed a set of mathematical tools we now know as calculus ever since then the idea of non integer derivatives and integrals universally referred to as fractional calculus has been of interest to many researchers however due to various issues the usage of fractional order models in real life applications was limited advances in modern computer science made it possible to apply efficient numerical methods to the computation of fractional derivatives and integrals this book describes novel methods developed by the author for fractional modeling and control together with their successful application in real world process control scenarios

this book introduces modeling and simulation of linear time invariant systems and demonstrates how these translate to systems engineering mechatronics engineering and biomedical engineering it is organized into nine chapters that follow the lectures used for a one semester course on this topic making it appropriate for students as well as researchers the author discusses state space modeling derived from two modeling techniques and the analysis of the system and usage of modeling in control systems design it also contains a unique chapter on multidisciplinary energy systems with a special focus on bioengineering systems and expands upon how the bond graph augments research in biomedical and bio mechatronics systems

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 knowledge 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 level 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 using matlab and simulink through user defined 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 controllers 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

modeling control and optimization of natural gas processing plants presents the latest on the evolution of the natural gas industry shining a light on the unique challenges plant managers and owners face when looking for ways to optimize plant performance and efficiency including topics such as the various feed gas compositions temperatures pressures and throughput capacities that keep them looking for better decision support tools the book delivers the first reference focused strictly on the fast growing natural gas markets whether you are trying to magnify your plants existing capabilities or are designing a new facility to handle more feedstock options this reference guides you by combining modeling control and optimization strategies with the latest developments within the natural gas industry including the very latest in algorithms software and real world case studies helps users adapt their natural gas plant quickly with optimization strategies and advanced control methods presents real world application for gas process operations with software and algorithm comparisons and practical case studies provides coverage on multivariable control and optimization on existing equipment allows plant managers and owners the tools they need to maximize the value of the natural gas produced

this book covers new aspects and frameworks of control design and optimization based on the tp model transformation and its various extensions the author outlines the three main steps of polytopic and lmi based control design 1 development of the qlpv state space model 2 generation of the polytopic model and 3 application of lmi to derive controller and observer he goes on to describe why literature has extensively studied lmi design but has not focused much on the second step in part because the generation and

manipulation of the polytopic form was not tractable in many cases the author then shows how the tp model transformation facilitates this second step and hence reveals new directions leading to powerful design procedures and the formulation of new questions the chapters of this book and the complex dynamical control tasks which they cover are organized so as to present and analyze the beneficial aspect of the family of approaches control design and optimization additionally the book aims to convey simple tp modeling a new convex hull manipulation based possibilities for optimization a general framework for stability analysis standardized modeling and system description relaxed and universal lmi based design framework and a gateway to time delayed systems

this book introduces electrical machine modeling and control for electrical engineering and science to graduate undergraduate students as well as researchers who are working on modeling and control of electrical machines it targets electrical engineering students who have no time to derive mathematical equations for electrical machines in particular induction machine im and doubly fed induction machines dfim the main focus is on the application of field oriented control technique to induction motor im and doubly fed induction motor dfim in details and since the induction motors have many drawback using this technique therefore the application of a nonlinear control technique feedback linearization is applied to a reduced order model of dfim to enhance the performance of doubly fed induction motor features serves as text book for electrical motor modeling simulation and control especially modeling of induction motor and doubly fed induction motor using different frame of references vector control field oriented control is given in more detailed and is applied to induction motor a nonlinear controller is applied to a reduced model of an doubly induction motor associated with a linear observer to estimate the unmeasured load torque which is used to enhance the performance of the vector control to doubly fed induction motor access to the full matlab simulink blocks for simulation and control

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