

Model Predictive Control System Design and Implementation Using MATLAB®

Model Predictive Control System Design And Implementation Using Matlabadvances In Industrial Control

Liuping Wang



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Model Predictive Control System Design and Implementation Using MATLAB® Liuping Wang,2009-03-04 Model Predictive Control System Design and Implementation Using MATLAB proposes methods for design and implementation of MPC systems using basis functions that confer the following advantages continuous and discrete time MPC problems solved in similar design frameworks a parsimonious parametric representation of the control trajectory gives rise to computationally efficient algorithms and better on line performance and a more general discrete time representation of MPC design that becomes identical to the traditional approach for an appropriate choice of parameters After the theoretical presentation coverage is given to three industrial applications The subject of quadratic programming often associated with the core optimization algorithms of MPC is also introduced and explained The technical contents of this book is mainly based on advances in MPC using state space models and basis functions This volume includes numerous analytical examples and problems and MATLAB programs and exercises

Model Predictive Control System Design and Implementation Using MATLAB® Liuping Wang,2009-02-14 Model Predictive Control System Design and Implementation Using MATLAB proposes methods for design and implementation of MPC systems using basis functions that confer the following advantages continuous and discrete time MPC problems solved in similar design frameworks a parsimonious parametric representation of the control trajectory gives rise to computationally efficient algorithms and better on line performance and a more general discrete time representation of MPC design that becomes identical to the traditional approach for an appropriate choice of parameters After the theoretical presentation coverage is given to three industrial applications The subject of quadratic programming often associated with the core optimization algorithms of MPC is also introduced and explained The technical contents of this book is mainly based on advances in MPC using state space models and basis functions This volume includes numerous analytical examples and problems and MATLAB programs and exercises

Advanced Model Predictive Control Tao Zheng,2011-07-05 Model Predictive Control MPC refers to a class of control algorithms in which a dynamic process model is used to predict and optimize process performance From lower request of modeling accuracy and robustness to complicated process plants MPC has been widely accepted in many practical fields As the guide for researchers and engineers all over the world concerned with the latest developments of MPC the purpose of Advanced Model Predictive Control is to show the readers the recent achievements in this area The first part of this exciting book will help you comprehend the frontiers in theoretical research of MPC such as Fast MPC Nonlinear MPC Distributed MPC Multi Dimensional MPC and Fuzzy Neural MPC In the second part several excellent applications of MPC in modern industry are proposed and efficient commercial software for MPC is introduced Because of its special industrial origin we believe that MPC will remain energetic in the future

27th European Symposium on Computer Aided Process Engineering,2017-09-21 27th European Symposium on Computer Aided Process Engineering Volume 40 contains the papers presented at

the 27th European Society of Computer Aided Process Engineering ESCAPE event held in Barcelona October 1 5 2017 It is a valuable resource for chemical engineers chemical process engineers researchers in industry and academia students and consultants for chemical industries Presents findings and discussions from the 27th European Society of Computer Aided Process Engineering ESCAPE event Advances in Data-Driven Computing and Intelligent Systems Jagdish Chand Bansal,Snehanshu Saha,Carlos A. Coello Coello,Hemant Rathore,2025-09-26 This book is a collection of best selected research papers presented at the International Conference on Advances in Data driven Computing and Intelligent Systems ADCIS 2024 held at BITS Pilani K Birla Goa Campus Goa India during September 20 21 2024 It includes state of the art research work in the cutting edge technologies in the field of data science and intelligent systems The book presents data driven computing it is a new field of computational analysis which uses provided data to directly produce predictive outcomes The book is useful for academicians research scholars and industry persons *Extremum-Seeking Control and Applications* Chunlei Zhang,Raúl Ordóñez,2011-10-26 Extremum seeking control tracks a varying maximum or minimum in a performance function such as output or cost It attempts to determine the optimal performance of a control system as it operates thereby reducing downtime and the need for system analysis Extremum seeking Control and Applications is divided into two parts In the first the authors review existing analog optimization based extremum seeking control including gradient perturbation and sliding mode based control designs They then propose a novel numerical optimization based extremum seeking control based on optimization algorithms and state regulation This control design is developed for simple linear time invariant systems and then extended for a class of feedback linearizable nonlinear systems The two main optimization algorithms line search and trust region methods are analyzed for robustness Finite time and asymptotic state regulators are put forward for linear and nonlinear systems respectively Further design flexibility is achieved using the robustness results of the optimization algorithms and the asymptotic state regulator by which existing nonlinear adaptive control techniques can be introduced for robust design The approach used is easier to implement and tends to be more robust than those that use perturbation based extremum seeking control The second part of the book deals with a variety of applications of extremum seeking control a comparative study of extremum seeking control schemes in antilock braking system design source seeking formation control collision and obstacle avoidance for groups of autonomous agents mobile radar networks and impedance matching MATLAB Simulink code which can be downloaded from www.springer.com ISBN helps readers to reproduce the results presented in the text and gives them a head start for implementing the algorithms in their own applications Extremum seeking Control and Applications will interest academics and graduate students working in control and industrial practitioners from a variety of backgrounds systems automotive aerospace communications semiconductor and chemical engineering Dry Clutch Control for Automotive Applications Pietro J. Dolcini,Carlos Canudas-de-Wit,Hubert Béchart,2010-05-27 Dry Clutch Control for Automated Manual Transmission Vehiclesanalyses the control of a part of the

powertrain which has a key role in ride comfort during standing start and gear shifting manoeuvres The mechanical conception of the various elements in the driveline has long since been optimised so this book takes a more holistic system oriented view of the problem featuring a comprehensive description of the driveline elements and their operation paying particular attention to the clutch a nonlinear model of the driveline for simulation and a simplified model for control design with a standing start driver automaton for closed loop simulation a detailed analysis of the engagement operation and the related comfort criteria different control schemes aiming at meeting these criteria friction coefficient and unknown input clutch torque observers practical implementation issues and solutions based on experience of implementing optimal engagement strategies on two Renault prototypes

Unmanned Rotorcraft Systems Guowei Cai, Ben M. Chen, Tong Heng Lee, 2011-06-01 Unmanned Rotorcraft Systems explores the research and development of fully functional miniature UAV unmanned aerial vehicle rotorcraft and provides a complete treatment of the design of autonomous miniature rotorcraft UAVs The unmanned system is an integration of advanced technologies developed in communications computing and control areas and is an excellent testing ground for trialing and implementing modern control techniques Included are detailed expositions of systematic hardware construction software systems integration aerodynamic modeling and automatic flight control system design Emphasis is placed on the cooperative control and flight formation of multiple UAVs vision based ground target tracking and landing on moving platforms Other issues such as the development of GPS less indoor micro aerial vehicles and vision based navigation are also discussed in depth utilizing the vision based system for accomplishing ground target tracking attacking and landing cooperative control and flight formation of multiple unmanned rotorcraft and future research directions on the related areas

PID and Predictive Control of Electrical Drives and Power Converters using MATLAB / Simulink Liuping Wang, Shan Chai, Dae Yoo, Lu Gan, Ki Ng, 2015-03-02 A timely introduction to current research on PID and predictive control by one of the leading authors on the subject PID and Predictive Control of Electric Drives and Power Supplies using MATLAB Simulink examines the classical control system strategies such as PID control feed forward control and cascade control which are widely used in current practice The authors share their experiences in actual design and implementation of the control systems on laboratory test beds taking the reader from the fundamentals through to more sophisticated design and analysis The book contains sections on closed loop performance analysis in both frequency domain and time domain presented to help the designer in selection of controller parameters and validation of the control system Continuous time model predictive control systems are designed for the drives and power supplies and operational constraints are imposed in the design Discrete time model predictive control systems are designed based on the discretization of the physical models which will appeal to readers who are more familiar with sampled data control system Soft sensors and observers will be discussed for low cost implementation Resonant control of the electric drives and power supply will be discussed to deal with the problems of bias in sensors and unbalanced three phase AC

currents Brings together both classical control systems and predictive control systems in a logical style from introductory through to advanced levels Demonstrates how simulation and experimental results are used to support theoretical analysis and the proposed design algorithms MATLAB and Simulink tutorials are given in each chapter to show the readers how to take the theory to applications Includes MATLAB and Simulink software using xPC Target for teaching purposes A companion website is available Researchers and industrial engineers and graduate students on electrical engineering courses will find this a valuable resource *Software Engineering Perspectives in Intelligent Systems* Radek Silhavy,Petr Silhavy,Zdenka Prokopova,2020-12-14 This book constitutes the refereed proceedings of the 4th Computational Methods in Systems and Software 2020 CoMeSySo 2020 proceedings Software engineering computer science and artificial intelligence are crucial topics for the research within an intelligent systems problem domain The CoMeSySo 2020 conference is breaking the barriers being held online CoMeSySo 2020 intends to provide an international forum for the discussion of the latest high quality research results

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Introduction

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