

Fundamentals Of Economic Model Predictive Control

Forecasting is required in many situations. Stocking an inventory may require forecasts of demand months in advance. Telecommunication routing requires traffic forecasts a few minutes ahead. Whatever the circumstances or time horizons involved, forecasting is an important aid in effective and efficient planning. This textbook provides a comprehensive introduction to forecasting methods and presents enough information about each method for readers to use them sensibly. Modern engineering processes and tasks are highly complex, multi- and interdisciplinary, requiring the cooperative effort of different specialists from engineering, mathematics, computer science and even social sciences. Optimization methodologies are fundamental instruments to tackle this complexity, giving the possibility to unite synergistically team members' inputs and thus decisively contribute to solving new engineering technological challenges. With this context in mind, the main goal of Engineering Optimization 2014 is to unite engineers, applied mathematicians, computer and other applied scientists working on research, development and practical application of optimization methods applied to all engineering disciplines, in a common scientific forum to present, analyze and discuss the latest developments in this area. Engineering Optimization 2014 contains the edited papers presented at the 4th International Conference on Engineering Optimization (ENGOPT2014, Lisbon, Portugal, 8-11 September 2014). ENGOPT2014 is the fourth edition of the biennial "International Conference on Engineering Optimization". The first conference took place in 2008 in Rio de Janeiro, the second in Lisbon in 2010 and the third in Rio de Janeiro in 2012. The contributing papers are organized around the following major themes: - Numerical Optimization Techniques - Design Optimization and Inverse Problems - Efficient Analysis and Reanalysis Techniques - Sensitivity Analysis - Industrial Applications - Topology Optimization For Structural Static and Dynamic Failures - Optimization in Oil and Gas Industries - New Advances in Derivative-Free Optimization Methods for Engineering Optimization - Optimization Methods in Biomechanics and Biomedical Engineering - Optimization of Laminated Composite Materials - Inverse Problems in Engineering Engineering Optimization 2014 will be of great interest to engineers and academics in engineering, mathematics and computer science.

Over the past few years significant progress has been achieved in the field of nonlinear model predictive control (NMPC), also referred to as receding horizon control or moving horizon control. More than 250 papers have been published in 2006 in ISI Journals. With this book we want to bring together the contributions of a diverse group of internationally well recognized researchers and industrial practitioners, to critically assess the current status of the NMPC field and to discuss future directions and needs. The book consists of selected papers presented at the International Workshop on Assessment an Future Directions of Nonlinear Model Predictive Control that took place from September 5 to 9, 2008, in Pavia, Italy.

Piderit explores the failures of mainstream economics and proposes an alternative grounded in natural law. His assessment is grounded in the Christian higher law tradition which assumes that objective standards known to human reason should govern society and individuals. This book demonstrates both the reasonableness of a distinguished ethical tradition and its capacity to address a wide range of ethical issues, economic as well as personal and social. Piderit emphasizes that natural law theory underlies the U.S. Constitution and informs Catholic, Protestant, and Jewish worship today.

Beyond Rhetoric and Realism in Economics

Distributed and economic model predictive control: beyond setpoint stabilization

Towards a Reformulation of Methodology

Real-Time Optimization

New Directions on Model Predictive Control

Advances in Automated Valuation Modeling

The Foundations of Positive and Normative Economics: A Handbook is the first book in a new series by Andrew Caplin and Andrew Schotter. There is currently no guide available on the rapidly changing methodological frontiers of the field of economics. Economists have been introducing new theories and new sources of data at a remarkable rate in recent years, and there are widely divergent views both on how productive these expansions have been in the past, and how best to make progress in the future. The speed of these changes has left economists ill at ease, and has created a backlash against new methods. The series will debate these critical issues, allowing proponents of a particular research method to present proposals in a safe yet critical context, with alternatives being clarified. This first volume, written by some of the most prominent researchers in the discipline, reflects the challenges that are opened by new research opportunities. The goal of the current volume and the series it presages, is to formally open a dialog on methodology. The editors' conviction is that such a debate will rebound to the benefit of social science in general, and economics in particular. The issues under discussion strike to the very heart of the social scientific enterprise. This work is of tremendous importance to all who are interested in the contributions that academic research can make not only to our scientific understanding, but also to matters of policy.

This textbook covers the essential aspects of process safety engineering in a practical and comprehensive manner. It provides readers with an understanding of process safety hazards in the refining and petrochemical industries and how to manage them in a reliable and professional manner. It covers the most important concepts: static electricity, intensity of thermal radiation, thermodynamics of fluid phase equilibria, boiling liquid expanding vapor explosion (BLEVE), emission source models, hazard identification methods, risk control and methods for achieving manufacturing excellence while also focusing on safety. Extensive case studies are included. Aimed at senior undergraduate and graduate chemical engineering students and practicing engineers, this book covers process safety principles and engineering practice authoritatively, with comprehensive examples: • Fundamentals, methods, and procedures for the industrial practice of process safety engineering. • The thermodynamic fundamentals and computational methods for release rates from ruptures in pipelines, vessels, and relief valves. • Fundamentals of static electricity hazards and their mitigation. • Quantitative assessment of fires and explosions. • Principles of dispersion calculations for toxic or flammable gases and vapors. • Methods of qualitative and quantitative risk assessment and control.

The first and only encyclopedia to focus on the economic and financial behaviors of consumers, investors, and organizations, including an exploration of how people make good—and bad—economic decisions. • Contains an informative introductory essay that familiarizes students with the various aspects of behavioral economics • Provides a list of additional readings for those interested in learning more about the topic • Includes cross-references in each entry to help readers make connections between related topics • Defines key terms that are likely to be unfamiliar to those without advance knowledge of the subject • Helps readers identify and study particular entry categories through accompanying Topic Finders

This paper shows that the equity premium is predictable out of sample when we use a predictive regression that conditions on a large set of economic fundamentals, subject to: (i) economic constraints on the sign of coefficients and return forecasts, and (ii) statistical constraints imposed by shrinkage estimation. Equity premium predictability delivers a certainty equivalent return of about 2.7% per year over the benchmark for a mean-variance investor. Our predictive framework outperforms a large group of competing models that also condition on economic fundamentals as well as models that condition on technical indicators.

A Handbook

AVM After the Non-Agency Mortgage Crisis

The Role of Economic and Statistical Constraints

Handbook of Model Predictive Control

Handling Valve Actuator Dynamics and Process Equipment Considerations

Alternative Energy Sources and Technologies

This book provides an overview of the nonlinear model predictive control (NMPC) concept for application to innovative combustion engines. Readers can use this book to become more expert in advanced combustion engine control and to develop and implement their own NMPC algorithms to solve challenging control tasks in the field. The significance of the advantages and relevancy for practice is demonstrated by real-world engine and vehicle application examples. The author provides an overview of fundamental engine control systems, and addresses emerging control problems, showing how they can be solved with NMPC. The implementation of NMPC involves various development steps, including: • reduced-order modeling of the process; • analysis of system dynamics; • formulation of the optimization problem; and • real-time feasible numerical solution of the optimization problem. Readers will see the entire process of these steps, from the fundamentals to several innovative applications. The application examples highlight the actual difficulties and advantages when implementing NMPC for engine control applications. Nonlinear Model Predictive Control of Combustion Engines targets engineers and researchers in academia and industry working in the field of engine control. The book is laid out in a structured and easy-to-read manner, supported by code examples in MATLAB®/Simulink®, thus expanding its readership to students and academics who would like to understand the fundamental concepts of NMPC. 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.

This book is a printed edition of the Special Issue "New Directions on Model Predictive Control" that was published in Mathematics

This book is a comprehensive introduction to model predictive control (MPC), including its basic principles and algorithms, system analysis and design methods, strategy developments and practical applications. The main contents of the book include an overview of the development trajectory and basic principles of MPC, typical MPC algorithms, quantitative analysis of classical MPC systems, design and tuning methods for MPC parameters, constrained multivariable MPC algorithms and online optimization decomposition methods. Readers will then progress to more advanced topics such as nonlinear MPC and its related algorithms, the diversification development of MPC with respect to control structures and optimization strategies, and robust MPC. Finally, applications of MPC and its generalization to optimization-based dynamic problems other than control will be discussed. Systematically introduces fundamental concepts, basic algorithms, and applications of MPC Includes a comprehensive overview of MPC development, emphasizing recent advances and modern approaches Features numerous MPC models and structures, based on rigorous research Based on the best-selling Chinese edition, which is a key text in China Predictive Control: Fundamentals and Developments is written for advanced undergraduate and graduate students and researchers specializing in control technologies. It is also a useful reference for industry professionals, engineers, and technicians specializing in advanced optimization control technology.

This book constitutes the thoroughly refereed post-proceedings of the 9th International Conference on Adaptive and Natural Computing Algorithms, ICANNGA 2009, held in Kuopio, Finland, in April 2009. The 63 revised full papers presented were carefully reviewed and selected from a total of 112 submissions. The papers are organized in topical sections on neural networks, evolutionary computation, learning, soft computing, bioinformatics as well as applications.

Process Design and Operation

Relaxed Barrier Function Based Model Predictive Control

Theory, Computation, and Design

Engineering Optimization 2014

9th International Conference, ICANNGA 2009, Kuopio, Finland, April 23-25, 2009, Revised Selected Papers

The book shows how the operation of renewable-energy microgrids can be facilitated by the use of model predictive control (MPC). It gives readers a wide overview of control methods for microgrid operation at all levels, ranging from quality of service, to integration in the electricity market. MPC-based solutions are provided for the main control issues related to energy management and optimal operation of microgrids. The authors present MPC techniques for case studies that include different renewable sources – mainly photovoltaic and wind – as well as hybrid storage using batteries, hydrogen and supercapacitors. Experimental results for a pilot-scale microgrid are also presented, as well as simulations of scheduling in the electricity market and integration of electric and hybrid vehicles into the microgrid. In order to replicate the examples provided in the book and to develop and validate control algorithms on existing or projected microgrids. Model Predictive Control of Microgrids will interest researchers and practitioners, enabling them to keep abreast of a rapidly developing field. The text will also help to guide graduate students through processes from the conception and initial design of a microgrid through its implementation to the optimization of microgrid management. 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.

This book presents general methods for the design of economic model predictive control (EMPC) systems for broad classes of nonlinear systems that address key theoretical and practical considerations including recursive feasibility, closed-loop stability, closed-loop performance, and computational efficiency. Specifically, the book proposes: Lyapunov-based EMPC methods for nonlinear systems; two-tier EMPC architectures that are highly computationally efficient; and EMPC schemes handling explicitly uncertainty, time-varying cost functions, time-delays and multiple-time-scale dynamics. The proposed methods employ a variety of tools ranging from nonlinear systems analysis, through Lyapunov-based control techniques to nonlinear dynamic optimization. The applicability and performance of the proposed methods are demonstrated through a number of chemical process examples. The book presents state-of-the-art methods for the design of economic model predictive control systems for chemical processes. In addition to being mathematically rigorous, these methods accommodate key practical issues, for example, direct optimization of process economics, time-varying economic cost functions and computational efficiency. Numerous comments and remarks providing fundamental understanding of the merging of process economics and feedback control into a single framework are included. A control engineer can easily tailor the many detailed examples of industrial relevance given within the text to a specific application. The authors present a rich collection of new research topics and references to significant recent work making Economic Model Predictive Control an important source of information and inspiration for academics and graduate students researching the area and for process engineers interested in applying its ideas.

This book addresses several problems related to automated valuation methodologies (AVM). Following the non-agency mortgage crisis, it offers a variety of approaches to improve the efficiency and quality of an automated valuation methodology (AVM) dealing with emerging problems and different contexts. Spatial issue, evolution of AVM standards, multilevel models, fuzzy and rough set applications and quantitative methods to define comparables are just some of the topics discussed.

Presenting a comprehensive analysis of the use of alternative sources of energy and technologies to produce fuels and power, this book describes the energy value chain from harvesting the raw material, (i.e solar, wind, biomass or shale gas) followed by analysis of the processing steps into power, fuels and/or chemicals and finally the distribution of the products. Featuring an examination of the techno-economic processes and integration opportunities which can add value to by-products or promote the use of different sources of energy within the same facility, this book looks at the tools that can make this integration possible as well as utilising a real world case study. The case study of the operation of "El Hierro" island is used as an example of the current effort towards more efficient use of the resources available. Tackling head on the open challenges of the supply, the variability of the source and its prediction, the description of novel processes that are being developed and evaluated for their transformation as well as how we can distribute them to the consumer and how we can integrate the new chemicals, fuels and power within the current system and infrastructure, the book takes a process based perspective with such an approach able to help us in the use and integration of these sources of energy and novel technologies.

Economic Model Predictive Control

Performance and Constraint Satisfaction in Robust Economic Model Predictive Control

Towards New Challenging Applications

Smart Economic Decision-Making in a Complex World

A Comprehensive Assessment of the Role of Risk in U.S. Agriculture

Advanced Solutions in Diagnostics and Fault Tolerant Control

Solving Urban Infrastructure Problems Using Smart City Technologies is the most complete guide for integrating next generation smart city technologies into the very foundation of urban areas worldwide, showing how to make urban areas more efficient, more sustainable, and safer. Smart cities are complex systems of systems that encompass all aspects of modern urban life. A key component of their success is creating an ecosystem of smart infrastructures that can work together to enable dynamic, real-time interactions between urban subsystems such as transportation, energy, healthcare, housing, food, entertainment, work, social interactions, and governance. Solving Urban Infrastructure Problems Using Smart City Technologies is a complete reference for building a holistic, system-level perspective on smart and sustainable cities, leveraging big data analytics and strategies for planning, zoning, and public policy. It offers in-depth coverage and practical solutions for how smart cities can utilize resident's intellectual and social capital, press environmental sustainability, increase personalization, mobility, and higher

quality of life. Brings together experts from academia, government and industry to offer state-of-the-art solutions for urban system problems, showing how smart technologies can be used to improve the lives of the billions of people living in cities across the globe Demonstrates practical implementation solutions through real-life case studies Enhances reader comprehension with learning aid such as hands-on exercises, questions and answers, checklists, chapter summaries, chapter review questions, exercise problems, and more

After all the research on agricultural risk to date, the treatment of risk in agricultural research is far from harmonious. Many competing risk models have been proposed. Some new methodologies are largely untested. Some of the leading empirical methodologies in agricultural economic research are poorly suited for problems with aggregate data where risk averse behavior is less likely to be important. This book is intended to (i) define the current state of the literature on agricultural risk research, (ii) provide a critical evaluation of economic risk research on agriculture to date and (iii) set a research agenda that will meet future needs and prospects. This type of research promises to become of increasing importance because agricultural policy in the United States and elsewhere has decidedly shifted from explicit income support objectives to risk-related motivations of helping farmers deal with risk. Beginning with the 1996 Farm Bill, the primary set of policy instruments from U.S. agriculture has shifted from target prices and set aside acreage to agricultural crop insurance. Because this book is intended to have specific implications for U.S. agricultural policy, it has a decidedly domestic scope, but clearly many of the issues have application abroad. For each of the papers and topics included in this volume, individuals have been selected to give the strongest and broadest possible treatment of each facet of the problem. The result is this comprehensive reference book on the economics of agricultural risk. This book presents a set of approaches for the real-time monitoring and control of drinking-water networks based on advanced information and communication technologies. It shows the reader how to achieve significant improvements in efficiency in terms of water use, energy consumption, water loss minimization, and water quality guarantees. The methods and approaches presented are illustrated and have been applied using real-life pilot demonstrations based on the drinking-water network in Barcelona, Spain. The proposed approaches and tools cover:
• decision-making support for real-time optimal control of water transport networks, explaining how stochastic model predictive control algorithms that take explicit account of uncertainties associated with energy prices and real demand allow the main flow and pressure actuators—pumping stations and pressure regulation valves— and intermediate storage tanks to be operated to meet demand using the most sustainable types of source and with minimum electricity costs;
• decision-making support for monitoring water balance and distribution network quality in real time, implementing fault detection and diagnosis techniques and using information from hundreds of flow, pressure, and water-quality sensors together with hydraulic and quality-parameter-evolution models to detect and locate leaks in the network, possible breaches in water quality, and failures in sensors and/or actuators;
• consumer-demand prediction, based on smart metering techniques, producing detailed analyses and forecasts of consumption patterns, providing a customer communications service, and suggesting economic measures intended to promote more efficient use of water at the household level. Researchers and engineers working with drinking-water networks will find this a vital support in overcoming the problems associated with increased population, environmental sensitivities and regulation, aging infrastructures, energy requirements, and limited water sources.

Coulson and Richardson’s Chemical Engineering: Volume 3B: Process Control, Fourth Edition, covers reactor design, flow modeling, and gas-liquid and gas-solid reactions and reactors. Converted from textbooks into fully revised reference material Content ranges from foundational through to technical Added emerging applications, numerical methods and computational tools

Theory, Formulations and Chemical Process Applications

Equity Premium Prediction

Principles and Industrial Applications

Predictive Functional Control

The Ethical Foundations of Economics

Fundamentals and Developments

There is a powerful and enduring economic tradition which holds that a paramount concern for economists should be the promotion of social justice. This book collects essays by many of the best known contemporary economists, in memory of Fausto Vicarelli, a leading figure in Keynesian economics. The contributors discuss the role of economic theory in tackling poverty and unemployment in both the developed and developing

world and in promoting a new international economic order. The outstanding international team of contributors includes Anthony. B. Atkinson, Paul Davidson, Jan Kregel, James Tobin and Hyman P. Mynsky.

Process Systems Engineering brings together the international community of researchers and engineers interested in computing-based methods in process engineering. This conference highlights the contributions of the PSE community towards the sustainability of modern society and is based on the 13th International Symposium on Process Systems Engineering PSE 2018 event held San Diego, CA, July 1-5 2018. The book contains contributions from academia and industry, establishing the core products of PSE, defining the new and changing scope of our results, and future challenges. Plenary and keynote lectures discuss real-world challenges (globalization, energy, environment and health) and contribute to discussions on the widening scope of PSE versus the consolidation of the core topics of PSE. Highlights how the Process Systems Engineering community contributes to the sustainability of modern society Establishes the core products of Process Systems Engineering Defines the future challenges of Process Systems Engineering

This book highlights the latest achievements concerning the theory, methods and practice of fault diagnostics, fault tolerant systems and cyber safety. When considering the diagnostics of industrial processes and systems, increasingly important safety issues cannot be ignored. In this context, diagnostics plays a crucial role as a primary measure of the improvement of the overall system safety integrity level. Obtaining the desired diagnostic coverage or providing an appropriate level of inviolability of the integrity of a system is now practically inconceivable without the use of fault detection and isolation methods. Given the breadth and depth of its coverage, the book will be of interest to researchers faced with the challenge of designing technical and medical diagnosis systems, as well as junior researchers and students in the fields of automatic control, robotics, computer science and artificial intelligence.

This book uses systemic thinking and applies it to the study of financial crises. It systematically presents how the systemic yoyo model, its thinking logic, and its methodology can be employed as a common playground and intuition to the study of money, international finance, and economic reforms. This book establishes theoretical backings for why some of the most employed interferences of the market and empirical experiences actually work. It has become urgent for economists and policy makers to understand how international speculative capital affects the economic security of various nations. By looking at the issues of monetary movement around the world, this book shows that there are clearly visible patterns behind the flows of capital, and that there are a uniform language and logic of reasoning that can be powerfully employed in the studies of international finance As shown in this book, many of the conclusions drawn on the basis of these visible patterns, language, and logic of thinking can be practically applied to produce tangible economic benefits. Currency Wars: Offense and Defense through Systemic Thinking is divided into six parts. The first part addresses issues related to systemic modeling of economic entities and processes and explains how a few policy changes can adjust the performance of the extremely complex economy. Part II of the book investigates the problem of how instabilities lead to opportunities for currency attacks, the positive and negative effects of foreign capital, and how international capital flows can cause disturbances of various degrees on a nation’s economic security. Part III examines how a currency war is initiated, why currency conflicts and wars are inevitable, and a specific way of how currency attacks can take place. In Part IV, the book shows how one nation can potential defend itself by manipulating exchange rate of its currency, how the nation under siege can protect itself against financial attacks by using strategies based on the technique of feedback, and develops a more general approach of self-defense. Part V focuses on issues related to the cleanup of the disastrous aftermath of currency attacks through using policies and reforms. Finally the book concludes in Part VI as it analyzes specific real-life cases and addresses the ultimate problem of whether or not currency wars can be avoided all together.

Nonlinear Model Predictive Control

Real-time Monitoring and Operational Control of Drinking-Water Systems

Volume 3B: Process Control

An Encyclopedia of Behavioral Economics

Fundamentals of Clinical Data Science

Model Predictive Control

The highly prized ability to make financial plans with some certainty about the future comes from the core fields of economics. In recent years the availability of more data, analytical tools of greater precision, and ex post studies of business decisions have increased demand for information about economic forecasting. Volumes 2A and 2B, which follows Nobel laureate Clive Granger’s Volume 1 (2007) methodologies, specifically macroforecasting and forecasting financial variables. Volume 2B investigates commercial applications, with sections on forecasters’ objectives and methodologies. Experts provide surveys of a large range of literature scattered across applied and theoretical statistics journals as well as econometrics and empirical economics journals. The Handbook of Economic Forecasting provides a coherent overview of forecasting theory and applications in one place and with up-to-date accounts of all major conceptual issues. Focuses on innovation in economic forecasting via industry applications Presents coherent summaries of subjects in economic forecasting that stretch from methodologies to applications Makes details about economic forecasting accessible to scholars in fields outside economics In this thesis, we introduce the novel concept of relaxed barrier function based model predictive control and present a comprehensive theoretical and algorithmic framework for the design, analysis, and implementation of relaxed barrier function based MPC approaches. Instead of treating the underlying optimization as an idealized static map, a key motive of the MPC results and algorithms presented is to use an iterative optimization algorithm in an integrated barrier function based framework and to analyze the resulting overall closed-loop system both from a systems theoretic and algorithmic perspective. One of the presented main results is a novel class of barrier function based anytime MPC algorithms that guarantee important properties of the closed-loop system independently of the number of iterations.

The obtained theoretical results are illustrated by various numerical examples and benchmark tests as well as by an experimental case study in which the proposed class of barrier function based MPC algorithms is applied to the predictive control of a self-driving car.

This open access book comprehensively covers the fundamentals of clinical data science, focusing on data collection, modelling and clinical applications. Topics covered in the first section on data collection include: data sources, data at scale (big data), data stewardship (FAIR data) and related privacy concerns. Aspects of predictive modelling using techniques such as classification, regression or decision trees are covered in the second section. The third section covers aspects of (mobile) clinical decision support systems, operational excellence and value-based healthcare. Fundamentals of Clinical Data Science is an essential resource for healthcare professionals and IT consultants intending to develop and refine their skills in personalized medicine, using solutions based on large datasets from electronic health records or telemedicine.

explain the topics in a style that is optimized for a healthcare audience.

first industrial application of MPC was in 1973. A key motivation was to provide better performance than could be obtained with the widely-used PID controller whilst making it easy to replace the PID controller unit or module with his new algorithm. It was the advent of digital control technology and the use of software control algorithms that made this replacement easier and more acceptable in the archival literature by Jacques Richalet et al. in 1978 in an important seminal Automatica paper. Around this time, Cutler and Ramaker published the dynamic matrix control algorithm that also used knowledge of future reference signals to determine a sequence of control signal adjustment. Thus, the theoretical and practical development of predictive control methods was underway and soon to be applied to the whole armoury of MPC methods. Jacques Richalet’s approach to PFC was to seek an algorithm that was:
• easy to understand;
• easy to install;
• easy to tune and optimise. He sought a new modular control algorithm that could be readily used by the control-technician engineer or the control-instrument engineer. It goes without saying that this objective also forms a good market strategy.

Fundamentals of Process Safety Engineering

Butterworths Series in Chemical Engineering

13th International Symposium on Process SystemsEngineering – PSE 2018, July 1-5 2018

Forecasting: principles and practice

The Concept of Equilibrium in Different Economic Traditions

Currency Wars

In this thesis, we develop a novel framework for model predictive control (MPC) which combines the concepts of robust MPC and economic MPC. The goal of this thesis is to develop and analyze MPC schemes for nonlinear discrete-time systems which explicitly consider the influence of disturbances on arbitrary performance criteria. Instead of regarding the two aspects separately, we propose robust economic MPC approaches that integrate information which is available about the disturbance directly into the economic framework. In more detail, we develop three concepts which differ in which information about the disturbance is used and how this information is taken into account. Furthermore, we provide a thorough theoretical analysis for each of the three approaches. To this end, we present results on the asymptotic average performance as well as on optimal operating regimes. Optimal operating regimes are closely related to the notion of dissipativity, which is therefore analyzed for the presented concepts. Under suitable assumptions, results on necessity and sufficiency of dissipativity for optimal steady-state operation are established for all three robust economic MPC concepts. A detailed discussion is provided which compares the different performance statements derived for the approaches as well as the respective notions of dissipativity.

This volume represents a contribution to the philosophy of economics with a distinctive point of view -- the contributors have selected particular areas of economics and have probed these areas for the philosophical and methodological issues that they raise. The primary essays are written by philosophers concentrating on philosophical issues that arise at the level of the everyday theoretical practice of working economists. Commentary essays are provided by working economists responding to the philosophical arguments from the standpoint of their own disciplines. The volume thus represents something of an `experiment' in the philosophy of science, striving as it does to explore methodological issues across two research communities.

The purpose of the volume is very specific: to stimulate a discussion of the epistemology and methodology of economics that works at the level of detail of existing `best practice' in economics today. The contributors have designed their contributions to stimulate productive conversation between philosophers and economists on topics in the methodology of economics.

This book is a printed edition of the Special Issue "Real-Time Optimization" that was published in Processes

Smart Economic Decision-Making in a Complex World is a fresh and reality-based perspective on decision-making with significant implications for analysis, self-understanding and policy. The book examines the conditions under which smart people generate outcomes that improve their place of work, their household and society. Within this work, the curious reader will find interesting open questions on many fascinating areas of current economic debate, including, the role of realistic assumptions robust model building, understanding how and when non-neoclassical behavior is best practice, why the assumption of smart decision-makers is best to understand and explain our economies and societies, and under what conditions individuals can make the best possible choices for themselves and society at large. Additional sections cover when and how efficiency is achieved, why inefficiencies can persist, when and how consumer welfare is maximized, and what benchmarks should be used to determine efficiency and rationality. Makes the case for 'smart and rational' decision-making as a context-dependent rational process that is framed by socio-cultural environment and conditioned by institutional capacities Explains how incorporation of the 'smart' decision-maker concept into economic thought improves our understanding of how, why and when people generate certain outcomes Explores how economic efficiency can be achieved, individual preferences realized, and social welfare maximized through the use of 'smart and rational' approaches

Handbook of Economic Forecasting

Offense and Defense through Systemic Thinking

Fundamental Process Control

Essays in the Philosophy of Economics

Handbook on Planning, Design, Development, and Regulation

The Foundations of Positive and Normative Economics

Economic Model Predictive Control (EMPC) is a control strategy that moves process operation away from the steady-state paradigm toward a potentially time-varying operating strategy to improve process profitability. The EMPC literature is replete with evidence that this new paradigm may enhance process profits when a model of the chemical process provides a sufficiently accurate representation of the process dynamics. Systems using EMPC often neglect the dynamics associated with equipment and are often neglected when modeling a chemical process. Recent studies have shown they can significantly impact the effectiveness of an EMPC system. Concentrating on valve behavior in a chemical process, this monograph develops insights into the manner in which equipment behavior should impact the design process for EMPC and to provide a perspective on a number of open research topics in this direction. Written in tutorial style, this monograph provides the reader with a full literature review of the topic and demonstrates how these techniques can be adopted in a practical system. Recent developments in model-predictive control promise remarkable opportunities for designing multi-input, multi-output control systems and improving the control of single-input, single-output systems. This volume provides a definitive survey of the latest model-predictive control methods available to engineers and scientists today. The initial set of chapters present various methods for managing uncertainty in systems, including stochastic model-predictive control. With the advent of affordable and fast computation, control engineers now need to think about using "computationally intensive controls," so the second part of this book addresses the solution of optimization problems in "real" time for model-predictive control. The theory and applications of control theory often influence each other, so the last section of Handbook of Model Predictive Control rounds out the book with representative applications to automobiles, healthcare, robotics, and finance. The chapters in this volume will be useful to working engineers, scientists, and mathematicians, as well as students and faculty interested in the progression of control theory. Future developments in MPC will no doubt build from concepts demonstrated in this book and anyone with an interest in MPC will find fruitful information and suggestions for additional reading. In this thesis, we study model predictive control (MPC) schemes for control tasks which go beyond the classical objective of setpoint stabilization. In particular, we consider two classes of such control problems, namely distributed MPC for cooperative control in networks of multiple interconnected systems, and economic MPC, where the main focus is on the optimization of some general performance criterion which is possibly related to the economics of a system. The contributions of this thesis are to analyze various systems theoretic properties occurring in these type of control problems, and to develop distributed and economic MPC schemes with certain desired (closed-loop) guarantees. To be more precise, in the field of distributed MPC we propose different algorithms which are suitable for general cooperative control tasks in networks of interacting systems. We show that the developed distributed MPC frameworks are such that the desired cooperative goal is achieved, while coupling constraints between the systems are satisfied. Furthermore, we discuss implementation and scalability issues for the derived algorithms, as well as the necessary communication requirements between the systems. In the field of economic MPC, the contributions of this thesis are threefold. Firstly, we analyze a crucial dissipativity condition, in particular its necessity for optimal steady-state operation of a system and its robustness with respect to parameter changes. Secondly, we develop economic MPC schemes which also take average constraints into account. Thirdly, we propose an economic MPC framework with self-tuning terminal cost and a generalized terminal constraint, and we show how self-tuning update rules for the terminal weight can be derived such that desirable closed-loop performance bounds can be established.

Boylan and O'Gorman inject a fresh empiricist voice into the recent debates in economic methodology.... praise the book for its careful scholarship, its intellectual novelty and its familiarity with existing methodological literature." D. Wade Hands, University of Puget Sound, USA

Solving Urban Infrastructure Problems Using Smart City Technologies

Predictive Control

27th European Symposium on Computer Aided Process Engineering

Model Predictive Control of Microgrids

Economic Theory and Social Justice

From Fundamentals to Applications

Economic Model Predictive Control Theory, Formulations and Chemical Process Applications Springer

Fundamental Process Control focuses on the fundamental nature of process control, which includes an extensive discussion on control methodologies. The first seven chapters are devoted to the development of a complete control problem formulation that contains all the elements of practical importance. Due to the novelty of these ideas, no rigorous mathematical proofs yet exist for the assertions made, although they have been verified through simulation and experience in practice. The concepts discussed in Chapters 8 and 9 contain ideas for future developments in process control that will trigger the imagination of researchers in the fields covered. This book requires a thorough grounding in both classical and modern control theory in order to grasp the material presented. This book is therefore not for casual readers, but rather is directed at those who are currently, or those who desire to develop into, control design experts. Within the academic community, this book is ideal for the graduate level and for those academics pursuing fundamental research topics in process control.

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

A Historical Investigation

Real-World Decision Making: An Encyclopedia of Behavioral Economics

On the Reliability of Economic Models

Nonlinear Model Predictive Control of Combustion Engines

Coulson and Richardson's Chemical Engineering

Adaptive and Natural Computing Algorithms