

Optimal Control Systems Electrical Engineering Handbook Mal

Optimal Control and Estimation
 Optimal Control
 Discrete-Time Inverse Optimal Control for Nonlinear Systems
 Optimal Sampled-Data Control Systems
 A Second Order Time Optimal Control System with Inertia and Damping
 Advanced Control Engineering
 State Estimation and Optimal Control with Orthogonal Functions
 Control System Advanced Methods, Second Edition
 An Introduction to State-Space Methods
 Robust and Optimal Control
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 Optimal Control Systems
 Decentralized Control of Complex Systems
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 The Control Systems Handbook
 Applications of Optimal Control Theory to Computer Controller Design
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 An Introduction
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Optimal Control and Estimation Courier Corporation

"Covers design methods for optimal (or quasioptimal) control algorithms in the form of synthesis for deterministic and stochastic dynamical systems with applications in aerospace, robotic, and servomechanical technologies. Providing new results on exact and approximate solutions of optimal control problems."

Optimal Control CRC Press

Geared toward upper-level undergraduates, this text introduces three aspects of optimal control theory: dynamic programming, Pontryagin's minimum principle, and numerical techniques for trajectory optimization. Numerous problems, which introduce additional topics and illustrate basic concepts, appear throughout the text. Solution guide available upon request. 131 figures. 14 tables. 1970 edition.

Discrete-Time Inverse Optimal Control for Nonlinear Systems John Wiley & Sons

Highlights the Hamiltonian approach to singularly perturbed linear optimal control systems. Develops parallel algorithms in independent slow and fast time scales for solving various optimal linear control and filtering problems in standard and nonstandard singularly perturbed systems, continuous- and discrete-time, deterministic and stochastic, mul

Optimal Sampled-Data Control Systems CRC Press

"This book attempts to reconcile modern linear control theory with classical control theory. One of the major concerns of this text is to present design methods, employing modern techniques, for obtaining control systems that stand up to the requirements that have been so well developed in the classical expositions of control theory. Therefore, among other things, an entire chapter is devoted to a description of the analysis of control systems, mostly following the classical lines of thought. In the later chapters of the book, in which modern synthesis methods are developed, the chapter on analysis is recurrently referred to. Furthermore, special attention is paid to subjects that are standard in classical control theory but are frequently overlooked in modern treatments, such as nonzero set point control systems, tracking systems, and control systems that have to cope with constant disturbances. Also, heavy emphasis is placed upon the stochastic nature of control problems because the stochastic aspects are so essential." -- Preface.

A Second Order Time Optimal Control System with Inertia and Damping John Wiley & Sons

Numerous examples highlight this treatment of the use of linear quadratic Gaussian methods for control system design. It explores linear optimal control theory from an engineering viewpoint, with illustrations of practical applications. Key topics include loop-recovery techniques, frequency shaping, and controller reduction. Numerous examples and complete solutions. 1990 edition.

Advanced Control Engineering Courier Dover Publications

Introduction to state-space methods covers feedback control; state-space representation of dynamic systems and dynamics of linear systems;

frequency-domain analysis; controllability and observability; shaping the dynamic response; more. 1986 edition.

State Estimation and Optimal Control with Orthogonal Functions CRC Press

Digital controllers are part of nearly all modern personal, industrial, and transportation systems. Every senior or graduate student of electrical, chemical or mechanical engineering should therefore be familiar with the basic theory of digital controllers. This new text covers the fundamental principles and applications of digital control engineering, with emphasis on engineering design. Fadali and Visioli cover analysis and design of digitally controlled systems and describe applications of digital controls in a wide range of fields. With worked examples and Matlab applications in every chapter and many end-of-chapter assignments, this text provides both theory and practice for those coming to digital control engineering for the first time, whether as a student or practicing engineer. Extensive Use of computational tools: Matlab sections at end of each chapter show how to implement concepts from the chapter Frees the student from the drudgery of mundane calculations and allows him to consider more subtle aspects of control system analysis and design An engineering approach to digital controls: emphasis throughout the book is on design of control systems. Mathematics is used to help explain concepts, but throughout the text discussion is tied to design and implementation. For example coverage of analog controls in chapter 5 is not simply a review, but is used to show how analog control systems map to digital control systems Review of Background Material: contains review material to aid understanding of digital control analysis and design. Examples include discussion of discrete-time systems in time domain and frequency domain (reviewed from linear systems course) and root locus design in s-domain and z-domain (reviewed from feedback control course) Inclusion of Advanced Topics In addition to the basic topics required for a one semester senior/graduate class, the text includes some advanced material to make it suitable for an introductory graduate level class or for two quarters at the senior/graduate level. Examples of optional topics are state-space methods, which may receive brief coverage in a one semester course, and nonlinear discrete-time systems Minimal Mathematics Prerequisites The mathematics background required for understanding most of the book is based on what can be reasonably expected from the average electrical, chemical or mechanical engineering senior. This background includes three semesters of calculus, differential equations and basic linear algebra. Some texts on digital control require more

Control System Advanced Methods, Second Edition CRC Press

Historically and technically important papers range from early work in mathematical control theory to studies in adaptive control processes.

Contributors include J. C. Maxwell, H. Nyquist, H. W. Bode, other experts. 1964 edition.

An Introduction to State-Space Methods CRC Press

Optimal Networked Control Systems with MATLAB® discusses optimal controller design in discrete time for networked control systems (NCS). The authors apply several powerful modern control techniques in discrete time to the design of intelligent controllers for such NCS. Detailed derivations, rigorous stability proofs, computer simulation examples, and downloadable MATLAB® codes are included for each case. The book begins by providing background on NCS, networked imperfections, dynamical systems, stability theory, and stochastic optimal adaptive controllers in discrete time for linear and nonlinear systems. It lays the foundation for reinforcement learning-based optimal adaptive controller use for finite and infinite horizons. The text then: Introduces quantization effects for linear and nonlinear NCS, describing the design of stochastic adaptive controllers for a class of linear and nonlinear systems Presents two-player zero-sum game-theoretic formulation for linear systems in input-output form enclosed by a communication network Addresses the stochastic optimal control of nonlinear NCS by using neuro dynamic programming Explores stochastic optimal design for nonlinear two-player zero-sum games under communication constraints Treats an event-sampled distributed NCS to minimize transmission of state and control signals within the feedback loop via the communication network Covers distributed joint optimal network scheduling and control design for wireless NCS, as well as the effect of network protocols on the wireless NCS controller design An ideal reference for graduate students, university researchers, and practicing engineers, Optimal Networked Control Systems with MATLAB® instills a solid understanding of neural network controllers and how to build them.

CRC Press

The theory of optimal control systems has grown and flourished since the 1960's. Many texts, written on varying levels of sophistication, have been published on the subject. Yet even those purportedly designed for beginners in the field are often riddled with complex theorems, and many treatments fail to include topics that are essential to a thorough grounding in the various aspects of and approaches to optimal control. Optimal Control Systems provides a comprehensive but accessible treatment of the subject with just the right degree of mathematical rigor to be complete but practical. It provides a solid bridge between "traditional" optimization using the calculus of variations and what is called "modern" optimal control. It also treats both continuous-time and discrete-time optimal control systems, giving students a firm grasp on both methods. Among this book's most outstanding features is a summary table that accompanies each topic or problem and includes a statement of the problem with a step-by-step solution. Students will also gain valuable experience in using industry-standard MATLAB and SIMULINK software, including the Control System and Symbolic Math Toolboxes. Diverse applications across fields from power engineering to medicine make a foundation in optimal control systems an essential part of an engineer's background. This clear, streamlined presentation is ideal for a graduate level course on control systems and as a quick reference for working engineers.

Robust and Optimal Control CRC Press

This Encyclopedia of Control Systems, Robotics, and Automation is a component of the global Encyclopedia of Life Support Systems EOLSS, which is an integrated compendium of twenty one Encyclopedias. This 22-volume set contains 240 chapters, each of size 5000-30000 words, with perspectives, applications and extensive illustrations. It is the only publication of its kind carrying state-of-the-art knowledge in the fields of Control Systems, Robotics, and Automation and is aimed, by virtue of the several applications, at the following five major target audiences: University and College Students, Educators, Professional Practitioners, Research Personnel and Policy Analysts, Managers, and Decision Makers and NGOs.

Control System Design John Wiley & Sons

In its highly organized overview of all areas, the book examines the design of modern optimal controllers requiring the selection of a performance criterion, demonstrates optimization of linear systems with bounded controls and limited control effort, and considers nonlinearities and their effect

on various types of signals.

Optimal Control Systems Courier Corporation

This self-contained book gives a detailed treatment of optimal control theory that enables readers to formulate and solve optimal control problems. With a strong emphasis on problem solving, it provides all the necessary mathematical analyses and derivations of important results, including multiplier theorems and Pontryagin's principle. The text presents various examples and basic concepts of optimal control and describes important numerical methods and computational algorithms for solving a wide range of optimal control problems, including periodic processes.

Decentralized Control of Complex Systems Springer

Unabridged republication of the edition published by Academic Press, 1970.

Continuous Time Dynamical Systems Courier Corporation

Upper-level undergraduate text introduces aspects of optimal control theory: dynamic programming, Pontryagin's minimum principle, and numerical techniques for trajectory optimization. Numerous figures, tables. Solution guide available upon request. 1970 edition.

Constrained Optimal Control of Linear and Hybrid Systems Springer Science & Business Media

The theory of optimal control systems has grown and flourished since the 1960's. Many texts, written on varying levels of sophistication, have been published on the subject. Yet even those purportedly designed for beginners in the field are often riddled with complex theorems, and many treatments fail to include topics that are essential to a thorough grounding in the various aspects of and approaches to optimal control. Optimal Control Systems provides a comprehensive but accessible treatment of the subject with just the right degree of mathematical rigor to be complete but practical. It provides a solid bridge between "traditional" optimization using the calculus of variations and what is called "modern" optimal control. It also treats both continuous-time and discrete-time optimal control systems, giving students a firm grasp on both methods. Among this book's most outstanding features is a summary table that accompanies each topic or problem and includes a statement of the problem with a step-by-step solution. Students will also gain valuable experience in using industry-standard MATLAB and SIMULINK software, including the Control System and Symbolic Math Toolboxes. Diverse applications across fields from power engineering to medicine make a foundation in optimal control systems an essential part of an engineer's background. This clear, streamlined presentation is ideal for a graduate level course on control systems and as a quick reference for working engineers.

The Control Systems Handbook Butterworth-Heinemann

Many practical control problems are dominated by characteristics such as state, input and operational constraints, alternations between different operating regimes, and the interaction of continuous-time and discrete event systems. At present no methodology is available to design controllers in a systematic manner for such systems. This book introduces a new design theory for controllers for such constrained and switching dynamical systems and leads to algorithms that systematically solve control synthesis problems. The first part is a self-contained introduction to multiparametric programming, which is the main technique used to study and compute state feedback optimal control laws. The book's main objective is to derive properties of the state feedback solution, as well as to obtain algorithms to compute it efficiently. The focus is on constrained linear systems and constrained linear hybrid systems. The applicability of the theory is demonstrated through two experimental case studies: a mechanical laboratory process and a traction control system developed jointly with the Ford Motor Company in Michigan.

Applications of Optimal Control Theory to Computer Controller Design CRC Press

Graduate-level text provides introduction to optimal control theory for stochastic systems, emphasizing application of basic concepts to real problems.

A Two-port Framework Approach Wiley-Interscience

Robust Industrial Control Systems: Optimal Design Approach for Polynomial Systems presents a comprehensive introduction to the use of frequency domain and polynomial system design techniques for a range of industrial control and signal processing applications. The solution of stochastic and robust optimal control problems is considered, building up from single-input problems and gradually developing the results for multivariable design of the later chapters. In addition to cataloguing many of the results in polynomial systems needed to calculate industrial controllers and filters, basic design procedures are also introduced which enable cost functions and system descriptions to be specified in order to satisfy industrial requirements. Providing a range of solutions to control and signal processing problems, this book: * Presents a comprehensive introduction to the polynomial systems approach for the solution of H_2 and H_∞ optimal control problems. * Develops robust control design procedures using frequency domain methods. * Demonstrates design examples for gas turbines, marine systems, metal processing, flight control, wind turbines, process control and manufacturing systems. * Includes the analysis of multi-degrees of freedom controllers and the computation of restricted structure controllers that are simple to implement. * Considers time-varying control and signal processing problems. * Addresses the control of non-linear processes using both multiple model concepts and new optimal control solutions. Robust Industrial Control Systems: Optimal Design Approach for Polynomial Systems is essential reading for professional engineers requiring an introduction to optimal control theory and insights into its use in the design of real industrial processes. Students and researchers in the field will also find it an excellent reference tool.

Optimal Control Systems with Low Sensitivity to Small Time Delays Optimal Control Systems

Comprehensive and accessible guide to the three main approaches to robust control design and its applications Optimal control is a mathematical field that is concerned with control policies that can be deduced using optimization algorithms. The optimal control approach to robust control design differs from conventional direct approaches to robust control that are more commonly discussed by firstly translating the robust control problem into its optimal control counterpart, and then solving the optimal control problem. Robust Control Design: An Optimal Control Approach offers a complete presentation of this approach to robust control design, presenting modern control theory in an concise manner. The other two major approaches to robust control design, the H_∞ approach and the Kharitonov approach, are also covered and described in the simplest terms possible, in order to provide a complete overview of the area. It includes up-to-date research, and offers both theoretical and practical applications that include flexible structures, robotics, and automotive and aircraft control. Robust Control Design: An Optimal Control Approach will be of interest to those needing an

introductory textbook on robust control theory, design and applications as well as graduate and postgraduate students involved in systems and control research. Practitioners will also find the applications presented useful when solving practical problems in the engineering field.

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