Linear Quadratic Optimal Control University Of Minnesota

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.

This textbook offers a concise yet rigorous introduction to calculus of variations and optimal control theory, and is a self-contained resource for graduate students in engineering, applied mathematics, and related subjects. Designed specifically for a one-semester course, the book begins with calculus of variations, preparing the ground for optimal control. It then gives a complete proof of the maximum principle and covers key topics such as the Hamilton-Jacobi-Bellman theory of dynamic programming and linear-quadratic optimal control. Calculus of Variations and Optimal Control Theory also traces the historical development of the subject and features numerous exercises, notes and references at the end of each chapter, and suggestions for further study. Offers a concise yet rigorous introduction Requires limited background in control theory or advanced mathematics Provides a complete proof of the maximum principle Uses consistent notation in the exposition of classical and modern topics Traces the historical development of the subject Solutions manual (available only to teachers) Leading universities that have adopted this book include: University of Illinois at Urbana-Champaign ECE 553: Optimum Control Systems Georgia Institute of Technology ECE 6553: Optimal Control and Optimization University of Pennsylvania ESE 680: Optimal Control Theory University of Notre Dame EE 60565: Optimal Control

Optimal Filtering

Singular and Nearly Singular Linear-quadratic Optimal Control and Filtering of Continuous Time-invariant Systems

OPTIMAL CONTROL OF A LINEAR SYSTEM WITH QUADRATIC COST UNDER A LINEAR HALF-SPACE STATE CONSTRAINT.

Linear Quadratic Optimal Control Problem for Linear Systems with Unbounded Input and Output Operators

The Linear Quadratic Optimal Control Problem for Infinite Dimensional Systems with Unbounded Input and Output Operators

Robust Control of Robots bridges the gap between robust control theory and applications, with a special focus on robotic manipulators. It is divided into three parts: robust control of regular, fully-actuated robotic manipulators; robust post-failure control of robotic manipulators; and robust control of cooperative robotic manipulators. In each chapter the mathematical concepts are illustrated with experimental results obtained with a two-manipulator system. They are presented in enough detail to allow readers to implement the concepts in their own systems, or in Control Environment for Robots, a MATLAB®-based simulation program freely available from the authors. The target audience for Robust Control of Robots includes researchers, practicing engineers, and graduate students interested in implementing robust and fault tolerant control methodologies to robotic manipulators.

Infinite dimensional systems is now an established area of research. Given the recent trend in systems theory and in applications towards a synthesis of time- and frequency-domain methods, there is a need for an introductory text which treats both state-space and frequency-domain aspects in an integrated fashion. The authors' primary aim is to write an introductory textbook for a course on infinite dimensional linear systems. An important consideration by the authors is that their book should be accessible to graduate engineers and mathematicians with a minimal background in functional analysis. Consequently, all the mathematical background is summarized in an extensive appendix. For the majority of students, this would be their only acquaintance with infinite dimensional systems.

The Optimal Control of Linear Systems Subject to Quadratic Performance Indices

Quadratic Optimal Control of Abstract Linear Systems

A priori results in linear-quadratic optimal control theory

Robust Control of Robots

Linear Quadratic Optimal Learning Control for Nonlinear System

Abstract: "A computationally attractive method for determining the optimal control of unconstrained linear dynamic systems with quadratic performance indices is presented. In the proposed method, the difference between each state variable and its initial condition is represented by a finite-term shifted Chebyshev series. The representation leads to a system of linear algebraic equations as the necessary condition of optimality. Simulation studies demonstrate computational advantages relative to a standard Riccati-based method, a transition matrix method, and a previous Fourier-based method."

This book gathers the most essential results, including recent ones, on linear-quadratic optimal control problems, which represent an important aspect of stochastic control. It presents results for two-player differential games and mean-field optimal control problems in the context of finite and infinite horizon problems, and discusses a number of new and interesting issues. Further, the book identifies, for the first time, the interconnections between the existence of open-loop and closed-loop Nash equilibria, solvability of the optimality system, and solvability of the associated Riccati equation, and also explores the open-loop solvability of mean-filed linear-quadratic optimal control problems. Although the content is largely self-contained, readers should have a basic grasp of linear algebra, functional analysis and stochastic ordinary differential equations. The book is mainly intended for senior undergraduate and graduate students majoring in applied mathematics who are interested in stochastic control theory. However, it will also appeal to researchers in other related areas, such as engineering, management, finance/economics and the social sciences.

Calculus of Variations and Optimal Control Theory - A Concise Introduction Instructor's Manual

Optimal Adaptive Control of Linear Distributed-parameter Systems with Quadratic Criteria

Numerical Operations

Frequency-domain Linear Quadratic Optimal Control Problem

On Some Linear-quadratic Optimal Control Problems for Descriptor Systems

Part I of this paper deals with the problem of designing a feedback control for a linear infinite dimensional system in such a way that a given quadratic cost functional is minimized. The essential feature of this work is that: (a) it allows for unbounded control and observation, i.e. boundary control, point observation, input/output delays; and (b) the general theory is presented in such a way that it applies to both parabolic and hyperbolic partial differential equations as well as retarded and neutral functional differential equations. Part II develops a state space approach for retarded systems with delays in both input and output. A particular emphasis is placed on the development of the duality theory by means of two different state concepts. The resulting evolution equations fit into the framework of Part I. (Author).

This book gathers the most essential results, including recent ones, on linear-quadratic optimal control problems, which represent an important aspect of stochastic control. It presents the results in the context of finite and infinite horizon problems, and discusses a number of new and interesting issues. Further, it precisely identifies, for the first time, the interconnections between three well-known, relevant issues - the existence of optimal controls, solvability of the optimality system, and solvability of the associated Riccati equation. Although the content is largely self-contained, readers should have a basic grasp of linear algebra, functional analysis and stochastic ordinary differential equations. The book is mainly intended for senior undergraduate and graduate students majoring in applied mathematics who are interested in stochastic control theory. However, it will also appeal to researchers in other related areas, such as engineering, management, finance/economics and the social sciences.

The Linear Quadratic Optimal Control Problem for Infinite Dimensional?systems with Unbound Input and Output Operators

preliminary draft

A Concise Introduction

Mathematical Control Theory for Stochastic Partial Differential Equations

Dynamics and Linear Quadratic Optimal Control of Flexible Multibody Systems

Stochastic Linear-Quadratic Optimal Control Theory: Open-Loop and Closed-Loop SolutionsSpringer Nature

Graduate-level text extends studies of signal processing, particularly regarding communication systems and digital filtering theory. Topics include filtering, linear systems, and estimation; discrete-time Kalman filter; time-invariant filters; more. 1979 edition.

A Linear Quadratic Optimal Control Approach for Selecting the PVA Control Gains of Pneumatic Servoactuators

Fault Tolerant Approaches

A Lie Theoretic Approach

An Introduction to Infinite-Dimensional Linear Systems Theory

Linear Quadratic Optimal Control System Design by Chebyshev-based State Parameterization

This textbook offers a concise yet rigorous introduction to calculus of variations and optimal control theory, and is a self-contained resource for graduate students in engineering, applied mathematics, and related subjects. Designed specifically for a one-semester course, the book begins with calculus of variations, preparing the ground for optimal control. It then gives a complete proof of the maximum principle and covers key topics such as the Hamilton-Jacobi-Bellman theory of dynamic programming and linear-quadratic optimal control. "Calculus of Variations and Optimal Control Theory" also traces the historical development of the subject and features numerous exercises, notes and references at the end of each chapter, and suggestions for further study. Offers a concise yet rigorous introduction Requires limited background in control theory or advanced mathematics Provides a complete proof of the maximum principle Uses consistent notation in the exposition of classical and modern topics Traces the historical development of the subject Solutions manual (available only to teachers) Leading universities that have adopted this book include: University of Illinois at Urbana-Champaign ECE 553: Optimum Control Systems Georgia Institute of Technology ECE 6553: Optimal Control and Optimization University of Pennsylvania ESE 680: Optimal Control Theory University of Notre Dame EE 60565: Optimal Control

This is the first book to systematically present control theory for stochastic distributed parameter systems, a comparatively new branch of mathematical control theory. The new phenomena and difficulties arising in the study of controllability and optimal control problems for this type of system are explained in detail. Interestingly enough, one has to develop new mathematical tools to solve some problems in this field, such as the global Carleman estimate for stochastic partial differential equations and the stochastic transposition method for backward stochastic evolution equations. In a certain sense, the stochastic distributed parameter control system is the most general control system in the context of classical physics. Accordingly, studying this field may also yield valuable insights into quantum control systems. A basic grasp of functional analysis, partial differential equations, and control theory for deterministic systems is the only prerequisite for reading this book.

Optimal Control

Optimal Control of Linear Systems with Generalized Quadratic Criteria

Linear Quadratic Optimal Control Design Using Chebyshev-based State Parameterization

Linear Quadratic Optimal Control Methods