

Contents :

Front Matter

- List of Figures — p. xv
- Acronyms — p. xix
- Mathematical Notation — p. xxi

Part I — Introduction

1. Introduction — p. 3

1.1 Intelligent Control Systems

1.2 Approaches to Intelligent Control

- 1.2.1 Contribution of Adaptive Control
- 1.2.2 Contribution of Artificial Intelligence
- 1.2.3 Confluence of Adaptive Control and AI: Intelligent Control
- 1.3 Enhancing the Performance of Intelligent Control
- 1.3.1 Multiple Model Schemes: Dealing with Complexity
- 1.3.2 Stochastic Adaptive Control: Dealing with Uncertainty
- 1.4 The Objectives and their Rationale — p. 16

Part II — Deterministic Systems

2. Adaptive Control of Nonlinear Systems — p. 23

2.1 Introduction

2.2 Continuous-time Systems

- 2.2.1 Control by Feedback Linearization
- 2.2.2 Control by Backstepping
- 2.2.3 Adaptive Control
- 2.3 Discrete-time Systems
- 2.3.1 Affine Approximations and Feedback Linearization
- 2.3.2 Adaptive Control
- 2.4 Summary

3. Dynamic Structure Networks for Stable Adaptive Control — p. 47

3.1 Introduction

3.2 Problem Formulation

3.3 Fixed-structure Network Solutions

3.4 Dynamic Network Structure

3.5 The Control Law and Error Dynamics

3.6 The Adaptive System

3.7 Stability Analysis

3.8 Evaluation of Control Parameters and Implementation

- 3.8.1 The Disturbance Bound
- 3.8.2 Choice of the Boundary Layer
- 3.8.3 Comments

- 3.8.4 Implementation
- 3.9 Simulation Examples
- 3.9.1 Example 1
- 3.9.2 Example 2
- 3.10 Summary

4. Composite Adaptive Control of Continuous-Time Systems — p. 79

4.1 Introduction

4.2 Problem Formulation

4.3 The Neural Networks

4.4 The Control Law

4.5 Composite Adaptation

- 4.5.1 The Identification Model
- 4.5.2 The Adaptation Law
- 4.6 Stability Analysis
- 4.7 Determination of the Disturbance Bounds
- 4.8 Simulation Examples
- 4.8.1 Example 1
- 4.8.2 Example 2
- 4.9 Summary

5. Functional Adaptive Control of Discrete-Time Systems — p. 101

5.1 Introduction

5.2 Problem Formulation

5.3 The Neural Network

5.4 The Control Law

5.5 The Adaptive System

5.6 Stability Analysis

5.7 Tracking Error Convergence

5.8 Simulation Examples

- 5.8.1 Example 1
- 5.8.2 Example 2
- 5.9 Extension to Adaptive Sliding Mode Control
- 5.9.1 Definitions of a Discrete-time Sliding Mode
- 5.9.2 Adaptive Sliding Mode Control
- 5.9.3 Problem Formulation
- 5.9.4 The Control Law
- 5.9.5 The Adaptive System
- 5.9.6 Stability Analysis
- 5.9.7 Sliding and Tracking Error Convergence
- 5.9.8 Simulation Example
- 5.10 Summary

The publisher's table of contents confirms these chapter titles and subsections.

Part III — Stochastic Systems

6. Stochastic Control — p. 131

6.1 Introduction

6.2 Fundamental Principles

6.3 Classes of Stochastic Control Problems

6.4 Dual Control

- 6.4.1 Degrees of Interaction
- 6.4.2 Solutions to the Implementation Problem
- 6.5 Conclusions

7. Dual Adaptive Control of Nonlinear Systems — p. 147

7.1 Introduction

7.2 Problem Formulation

7.3 Dual Controller Design

- 7.3.1 GaRBF Dual Controller
- 7.3.2 Sigmoidal MLP Dual Controller
- 7.3.3 Analysis of the Control Laws
- 7.4 Simulation Examples and Performance Evaluation
- 7.4.1 Example 1
- 7.4.2 Example 2
- 7.5 Summary

8. Multiple Model Approaches — p. 165

8.1 Introduction

8.2 Basic Formulation

- 8.2.1 Multiple Model Adaptive Control
- 8.2.2 Jump Systems
- 8.3 Adaptive I/O Models
- 8.3.1 Scheduled Mode Transitions
- 8.4 Summary

9. Multiple Model Dual Adaptive Control of Jump Nonlinear Systems — p. 187

9.1 Introduction

9.2 Problem Formulation

9.3 The Estimation Problem

- 9.3.1 Known Mode Case
- 9.3.2 Unknown Mode Case
- 9.4 Self-organized Allocation of Local Models
- 9.5 The Control Law
- 9.5.1 Known Mode Case
- 9.5.2 Unknown Mode Case
- 9.6 Simulation Examples and Performance Evaluation
- 9.6.1 Example 1
- 9.6.2 Example 2
- 9.7 Summary

10. Multiple Model Dual Adaptive Control of Spatial Multimodal Systems — p. 213

10.1 Introduction

10.2 Problem Formulation

10.3 The Modular Network

10.4 The Estimation Problem

- 10.4.1 Local Model Parameter Estimation
- 10.4.2 Validity Function Estimation
- 10.5 The Control Law
 - 10.5.1 Known System Case
 - 10.5.2 Unknown System Case
- 10.6 Simulation Examples and Performance Evaluation
 - 10.6.1 Example 1
 - 10.6.2 Example 2
 - 10.6.3 Performance Evaluation
- 10.7 Summary

Part IV — Conclusions

11. Conclusions — p. 245

- References — p. 251
- Index — p. 265