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Design; 3.4 Decay Rate; 3.5 Constraints on Control Input and Output; 3.5.1 Constraint on the Control Input; 3.5.2 Constraint on the Output; 3.6 Initial State Independent Condition; 3.7 Disturbance Rejection; 3.8 Design Example: A Simple Mechanical System 3.8.1 Design Case 1: Decay Rate 3.8.2 Design Case 2: Decay Rate + Constraint on the Control Input; 3.8.3 Design Case 3: Stability + Constraint on the Control Input; 3.8.4 Design Case 4: Stability + Constraint on the Control Input + Constraint on the Output; References; 4 FUZZY OBSERVER DESIGN; 4.1 Fuzzy Observer; 4.2 Design of Augmented Systems; 4.2.1 Case A; 4.2.2 Case B; 4.3 Design Example; References; 5 ROBUST FUZZY CONTROL; 5.1 Fuzzy Model with Uncertainty; 5.2 Robust Stability Condition; 5.3 Robust Stabilization; References; 6 OPTIMAL FUZZY CONTROL 6.1 Quadratic Performance Function and Stabilization Control 6.2 Optimal Fuzzy Controller Design; Appendix to Chapter 6; References; 7 ROBUST-OPTIMAL FUZZY CONTROL; 7.1 Robust-Optimal Fuzzy Control Problem; 7.2 Design Example: TORA; References; 8 TRAJECTORY CONTROL OF A VEHICLE WITH MULTIPLE TRAILERS; 8.1 Fuzzy Modeling of a Vehicle with Triple-Trailers; 8.1.1 Avoidance of Jack-Knife Utilizing Constraint on Output; 8.2 Simulation Results; 8.3 Experimental Study; 8.4 Control of Ten-Trailer Case; References; 9 FUZZY MODELING AND CONTROL OF CHAOTIC SYSTEMS; 9.1 Fuzzy Modeling of Chaotic Systems 9.2 Stabilization 9.2.1 Stabilization via Parallel Distributed Compensation; 9.2.2 Cancellation Technique; 9.3 Synchronization; 9.3.1 Case 1; 9.3.2 Case 2; 9.4 Chaotic Model Following Control; References; 10 FUZZY DESCRIPTOR SYSTEMS AND CONTROL; 10.1 Fuzzy Descriptor System; 10.2 Stability Conditions; 10.3 Relaxed Stability Conditions; 10.4 Why Fuzzy Descriptor Systems?; References; 11 NONLINEAR MODEL FOLLOWING CONTROL; 11.1 Introduction; 11.2 Design Concept; 11.2.1 Reference Fuzzy Descriptor System; 11.2.2 Twin-Parallel Distributed Compensations; 11.2.3 The Common B Matrix Case 11.3 Design Examples

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#### Sommario/riassunto

A comprehensive treatment of model-based fuzzy control systems. This volume offers full coverage of the systematic framework for the stability and design of nonlinear fuzzy control systems. Building on the Takagi-Sugeno fuzzy model, authors Tanaka and Wang address a number of important issues in fuzzy control systems, including stability analysis, systematic design procedures, incorporation of performance specifications, numerical implementations, and practical applications. Issues that have not been fully treated in existing texts, such as stability analysis, systematic design, and

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