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Nota di bibliografia	Includes bibliographical references at the end of each chapters and index.
Nota di contenuto	Introduction and Fundamentals of Optimized Adaptive Controllers and Systems -- Introduction to Optimized Adaptive Controllers and Systems -- Scenarios, Notation and Stability Conditions -- Exercises for Part I -- Design of the Driver Block: Basic and Extended Predictive Control Strategies -- Basic Strategy of Predictive Control -- Extended Strategy of Predictive Control -- Exercises for Part II -- Design of the Adaptation Mechanism: Synthesis of the Adaptive System -- Analysis and Synthesis of the Adaptive System in the Real Case -- Exercises for Part III -- Stability Theory of Adaptive Predictive Control -- Stability Theory -- Exercises for Part IV -- Benchmark Applications of Predictive, Adaptive Predictive, and Optimized Adaptive Control -- Multivariable Control of a Distillation Column -- Control of a Bleach Plant in a Pulp Factory -- Technological realization of ADEX Optimized Adaptive Control Systems -- A Software Platform for Adaptive Predictive Expert Control Applications -- Application of ADEX COP v.1 to the Biological Process of a Wastewater Treatment Plant -- ADEX Optimized Adaptive Control System for the Sulfur Recovery Process at Pemex Cadereyta

Sommario/riassunto

This book is a didactic explanation of the developments of predictive, adaptive predictive and optimized adaptive control, including the latest methodology of adaptive predictive expert (ADEX) control, and their practical applications. It is focused on the stability perspective, used in the introduction of these methodologies, and is divided into six parts, with exercises and real-time simulations provided for the reader as appropriate. ADEX Optimized Adaptive Controllers and Systems begins with the conceptual and intuitive knowledge of the technology and derives the stability conditions to be verified by the driver block and the adaptive mechanism of the optimized adaptive controller to guarantee achievement of desired control performance. The second and third parts are centered on the design of the driver block and adaptive mechanism, which verify these stability conditions. The authors then proceed to detail the stability theory that supports predictive, adaptive predictive and optimized adaptive control methodologies. Benchmark applications of these methodologies (distillation column, pulp-factory bleaching plant and flexible structures) are treated next with a focus on practical implementation issues. The final part of the book describes ADEX platforms, and illustrates their use in the design and implementation of optimized adaptive control systems in three different challenging-to-control industrial processes: - waste-water treatment; - sulfur recovery; and - temperature control of superheated steam in coal-fired power generation. The presentation is completed by a number of appendices containing technical background associated with the main text, including a manual for the first ADEX COP platform developed to exploit the capabilities of adaptive predictive control in real plants. ADEX Optimized Adaptive Controllers and Systems provides practicing process control engineers with a multivariable optimized control solution which is adaptive and resistant to changes in process dynamics, perturbations and the effects of noise. Its pedagogical features also facilitate its use as a teaching tool for formal university and Internet-based open-education-type graduate courses in practical optimized adaptive control and for self-study. Advances in Industrial Control aims to report and encourage 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.