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Descrizione fisica	1 online resource (463 p.)
Collana	Advanced Textbooks in Control and Signal Processing, , 1439-2232
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Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Part I: Robust and Optimal Control of Linear Systems -- Introduction to Control of Aerial Vehicles -- Command Tracking and Servomechanism Design.0 Optimal Control and Linear Quadratic Regulator (LQR) -- H-infinity Optimal Control -- Stability Margins and Frequency Domain Consideration -- Projective Control -- Linear Quadratic Gaussian with Loop-transfer Recovery (LQG/LTR) Control -- Simulation Examplse and Case Studies -- Exercises -- Part II: Model Reference Adaptive Control -- Motivation -- Lyapunov Stability Theory: Introduction and Overview -- Adaptive Control Architectures: Direct vs. Indirect -- MRAC and Model Matching Conditions -- Adaptive Dynamic Inversion -- Persistency of Excitation -- Enforcing Robustness in MRAC Systems -- Approximation-based MRAC -- Adaptive Augmentation of a Linear Baseline Controller -- Simulation Examples and Case Studies -- Exercises -- Part III: MRAC Design Extensions -- Limited-authority Adaptive Control -- Predictor-based Control -- Combined/Composite MRAC -- Filtered MRAC Design -- MRAC Design Using Output Feedback -- Simulation Examples and Case Studies -- Conclusions,

Future Work and Flight Control Challenges.

Sommario/riassunto

Robust and Adaptive Control shows the reader how to produce consistent and accurate controllers that operate in the presence of uncertainties and unforeseen events. Driven by aerospace applications the focus of the book is primarily on continuous-dynamical systems. The text is a three-part treatment, beginning with robust and optimal linear control methods and moving on to a self-contained presentation of the design and analysis of model reference adaptive control (MRAC) for nonlinear uncertain dynamical systems. Recent extensions and modifications to MRAC design are included, as are guidelines for combining robust optimal and MRAC controllers. Features of the text include: · case studies that demonstrate the benefits of robust and adaptive control for piloted, autonomous and experimental aerial platforms; · detailed background material for each chapter to motivate theoretical developments; · realistic examples and simulation data illustrating key features of the methods described; and · problem solutions for instructors and MATLAB® code provided electronically. The theoretical content and practical applications reported address real-life aerospace problems, being based on numerous transitions of control-theoretic results into operational systems and airborne vehicles that are drawn from the authors' extensive professional experience with The Boeing Company. The systems covered are challenging, often open-loop unstable, with uncertainties in their dynamics, and thus requiring both persistently reliable control and the ability to track commands either from a pilot or a guidance computer. Readers are assumed to have a basic understanding of root locus, Bode diagrams, and Nyquist plots, as well as linear algebra, ordinary differential equations, and the use of state-space methods in analysis and modeling of dynamical systems. Robust and Adaptive Control is intended to methodically teach senior undergraduate and graduate students how to construct stable and predictable control algorithms for realistic industrial applications. Practicing engineers and academic researchers will also find the book of great instructional value.