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| Nota di contenuto | Cover; Title Page; Copyright Page; Dedication; Contents; Preface; Chapter 1 Feedback Control; 1.1 The Mechanism of Feedback; 1.2 Feedback Control Engineering; 1.3 Control Theory Background; 1.4 Scope and Organization of This Book; Notes; References; Chapter 2 State-Space Representation of Dynamic Systems; 2.1 Mathematical Models; 2.2 Physical Notion of System State; 2.3 Block-Diagram Representations; 2.4 Lagrange's Equations; 2.5 Rigid Body Dynamics; 2.6 Aerodynamics; 2.7 Chemical and Energy Processes; Problems; Notes; References; Chapter 3 Dynamics of Linear Systems |

3.1 Differential Equations Revisited 3.2 Solution of Linear Differential Equations in State-Space Form; 3.3 Interpretation and Properties of the State-Transition Matrix; 3.4 Solution by the Laplace Transform: The Resolvent; 3.5 Input-Output Relations: Transfer Functions; 3.6 Transformation of State Variables; 3.7 State-Space Representation of Transfer Functions: Canonical Forms; Problems; Notes; References; Chapter 4 Frequency-Domain Analysis; 4.1 Status of Frequency-Domain Methods; 4.2 Frequency-Domain Characterization of Dynamic Behavior; 4.3 Block-Diagram Algebra; 4.4 Stability 4.5 Routh-Hurwitz Stability Algorithms 4.6 Graphical Methods; 4.7 Steady State Responses: System Type; 4.8 Dynamic Response: Bandwidth; 4.9 Robustness and Stability (Gain and Phase) Margins; 4.10 Multivariable Systems: Nyquist Diagram and Singular Values; Problems; Notes; References; Chapter 5 Controllability and Observability; 5.1 Introduction; 5.2 Where Do Uncontrollable or Unobservable Systems Arise?; 5.3 Definitions and Conditions for Controllability and Observability; 5.4 Algebraic Conditions for Controllability and Observability; 5.5 Disturbances and Tracking Systems: Exogenous Variables Problems Notes; References; Chapter 6 Shaping the Dynamic Response; 6.1 Introduction; 6.2 Design of Regulators for Single-Input, Single-Output Systems; 6.3 Multiple-Input Systems; 6.4 Disturbances and Tracking Systems: Exogenous Variables; 6.5 Where Should the Closed-Loop Poles Be Placed?; Problems; Notes; References; Chapter 7 Linear Observers; 7.1 The Need for Observers; 7.2 Structure and Properties of Observers; 7.3 Pole-Placement for Single-Output Systems; 7.4 Disturbances and Tracking Systems: Exogenous Variables; 7.5 Reduced-Order Observers; Problems; Notes; References Chapter 8 Compensator Design by the Separation Principle 8.1 The Separation Principle; 8.2 Compensators Designed Using Full-Order Observers; 8.3 Reduced-Order Observers; 8.4 Robustness: Effects of Modeling Errors; 8.5 Disturbances and Tracking Systems: Exogenous Variables; 8.6 Selecting Observer Dynamics: Robust Observers; 8.7 Summary of Design Process; Problems; Notes; References; Chapter 9 Linear, Quadratic Optimum Control; 9.1 Why Optimum Control?; 9.2 Formulation of the Optimum Control Problem; 9.3 Quadratic Integrals and Matrix Differential Equations; 9.4 The Optimum Gain Matrix 9.5 The Steady State Solution

Sommario/riassunto

Addressed not only to students but also to professional engineers and scientists, this volume introduces state-space methods for direct application to control system design, in addition to providing background for reading the periodical literature. Its presentation, therefore, is suitable both for those who require methods for achieving results and those more interested in using results than in proving them. Topics include feedback control, state-space representation of dynamic systems and dynamics of linear systems, frequency-domain analysis, controllability and observability, and shaping the