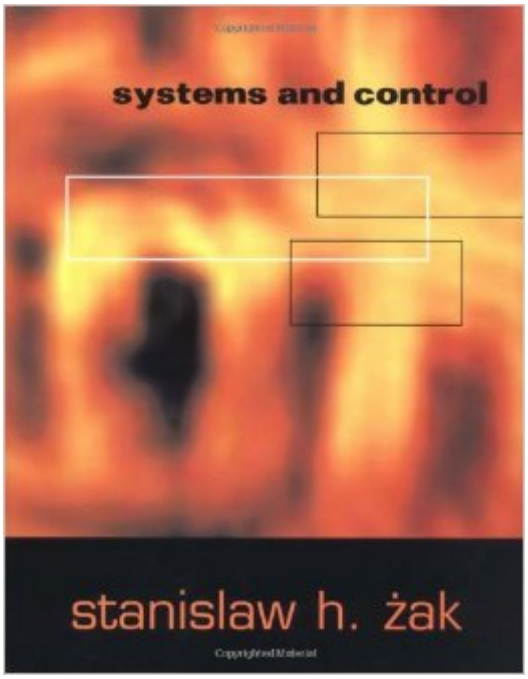
Systems And Control (The Oxford Series In Electrical And Computer Engineering)



Synopsis

Systems and Control presents modeling, analysis, and control of dynamical systems. Introducing students to the basics of dynamical system theory and supplying them with the tools necessary for control system design, it emphasizes design and demonstrates how dynamical system theory fits into practical applications. Classical methods and the techniques of postmodern control engineering are presented in a unified fashion, demonstrating how the current tools of a control engineer can supplement more classical tools. Broad in scope, Systems and Control shows the multidisciplinary role of dynamics and control; presents neural networks, fuzzy systems, and genetic algorithms; and provides a self-contained introduction to chaotic systems. The text employs Lyapunov's stability theory as a unifying medium for different types of dynamical systems, using it--with its variants--to analyze dynamical system models. Specifically, optimal, fuzzy, sliding mode, and chaotic controllers are all constructed with the aid of the Lyapunov method and its extensions. In addition, a class of neural networks is also analyzed using Lyapunov's method. Ideal for advanced undergraduate and beginning graduate courses in systems and control, this text can also be used for introductory courses in nonlinear systems and modern automatic control. It requires working knowledge of basic differential equations and elements of linear algebra; a review of the necessary mathematical techniques and terminology is provided.

Book Information

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Customer Reviews

The important link between modeling and control of dynamical systems is once more emphasized in "Systems & Control" by Stanislaw H. Zak. The book is an excellent addition to the control literature as it revisits the mathematical modeling and analysis problems of dynamical systems while addressing the controller design problem by means of a variety of modern techniques.Chapter 1 introduces the notion of a system and includes numerous examples illustrating the mathematical modeling of dynamical systems by ordinary differential equations. Chapter 2 is devoted to the analysis and approximate solution techniques of the model equations using phase-portraits, numerical methods, linearization and describing functions. Chapter 3 discusses the linear systems and serves as a warm-up for the nonlinear control methods to be addressed in the subsequentchapters. Chapter 4 presents a thorough stability analysis as well as the essentials of the Lyapunov theory for both linear and nonlinear systems. With a section on the stabilizing state-feedback controllers, the reader also gets acquainted with the controller design based on the Lyapunov theory. Chapter 5 is dedicated to the optimal control of the dynamical systems. Especially, the section titled "A Glimpse at the Calculus of Variations" is very helpful in the sense that it equips the reader with the necessary tools required for the rest of the chapter. Variable structure systems are discussed and the design of sliding mode controllers is illustrated in Chapter 6. In Chapter 7, a combined controller-estimator compensator is designed for a class of dynamical systems using Lie derivatives and the vector field methods.

Code Reference: Based on the 2011 National Electrical Code (DEWALT Series) Diagnosis and Troubleshooting of Automotive Electrical, Electronic, and Computer Systems (5th Edition) Control Self-Assessment: Reengineering Internal Control (Enterprise Governance, Control, Audit, Security, Risk Management and Business Continuity) Energy Audit of Building Systems: An Engineering Approach, Second Edition (Mechanical and Aerospace Engineering Series) Medical Device Technologies: A Systems Based Overview Using Engineering Standards (Academic Press Series in Biomedical Engineering) Illustrated Guide to the National Electrical Code (Illustrated Guide to the National Electrical Code (Nec)) McGraw-Hill's National Electrical Code 2014 Handbook, 28th Edition (McGraw Hill's National Electrical Code Handbook)