



Adaptive Control of Systems with Actuator and Sensor Nonlinearities (Adaptive and Cognitive Dynamic Systems: Signal Processing, Learning, Communications and Control)

By Gang Tao, Petar V. Kokotovic

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An in-depth examination of intelligent approaches to increasing the accuracy of a variety of system components. Utilizing a unified, adaptive, inverse approach, the book offers electrical, mechanical, chemical, aeronautical and computer engineers methods for controlling many of the "hard" nonlinearities of frequently-employed control systems such as dead-zone, backlash and hysteresis. Discusses such nonlinearities at both the input and output points of a linear part and within both continuous time designs and discrete time designs.

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Editorial Review

From the Publisher

An in-depth examination of intelligent approaches to increasing the accuracy of a variety of system components. Utilizing a unified, adaptive, inverse approach, the book offers electrical, mechanical, chemical, aeronautical and computer engineers methods for controlling many of the "hard" nonlinearities of frequently-employed control systems such as dead-zone, backlash and hysteresis. Discusses such nonlinearities at both the input and output points of a linear part and within both continuous time designs and discrete time designs.

From the Back Cover

With the growing use of feedback controls, "hard" nonlinearities have become ubiquitous in engineering practice despite their rare treatment in academic texts. This book introduces a unified adaptive inverse approach for the control of systems with unknown nonlinearities and settles long-standing engineering problems posed by imperfections of actuators and sensors.

Focusing on dead-zone, backlash, and hysteresis, the authors show how real-time computations can counteract the effects of these nonlinearities. In many applications their approach avoids the need for costly and specialized hardware.

This easy-to-use, self-contained presentation of the entirely new adaptive inverse design is geared towards practicing engineers, researchers, and graduate students.

Adaptive Control of Systems with Actuator and Sensor Nonlinearities features:

- * Systematic treatment for actuator and sensor nonlinearities.
- * Examples of dead-zone, backlash, and hysteresis models and their inverses.
- * Broad coverage that ranges from satellite antennas and piezo-positioners to industrial automation and consumer electronics.
- * Step-by-step instructions for adaptive inverse design and implementation.
- * Unified continuous- and discrete-time presentation.
- * A concise review of model reference adaptive control theory.
- * Extensive illustrations of system performance improvement.
- * Over ninety figures and design examples.

About the Author

GANG TAO received his PhD in electrical engineering from the University of Southern California in 1989. He is currently an assistant professor in the Department of Electrical Engineering at the University of Virginia. PETAR V. Kokotovi has been Director of the Center for Control Engineering and Computation at the University of California, Santa Barbara, since 1991. Previously, he was with the University of Illinois, where he held the Grainger Chair. He is a member of the National Academy of Engineering. His recognition as a leading authority in control theory theory includes the triennial Quazza Medal by IFAC in 1990 and the 1995 IEEE Control Systems Award.

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