

### Robust and Adaptive Control: With Aerospace Applications (Advanced Textbooks in Control and Signal Processing)

Eugene Lavretsky, Kevin Wise



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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.

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