Modern Anti-windup Synthesis: Control Augmentation for Actuator Saturation (Princeton Series in Applied Mathematics)

Luca Zaccarian, Andrew R. Teel

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This book provides a wide variety of state-space--based numerical algorithms for the synthesis of feedback algorithms for linear systems with input saturation. Specifically, it addresses and solves the anti-windup problem, presenting the objectives and terminology of the problem, the mathematical tools behind anti-windup algorithms, and more than twenty algorithms for anti-windup synthesis, illustrated with examples. Luca Zaccarian and Andrew Teel's modern method--combining a state-space approach with algorithms generated by solving linear matrix inequalities--treats MIMO and SISO systems with equal ease. The book, aimed at control engineers as well as graduate students, ranges from very simple anti-windup construction to sophisticated anti-windup algorithms for nonlinear systems.

- Describes the fundamental objectives and principles behind anti-windup synthesis for control systems with actuator saturation
- Takes a modern, state-space approach to synthesis that applies to both SISO and MIMO systems
- Presents algorithms as linear matrix inequalities that can be readily solved with widely available software
- Explains mathematical concepts that motivate synthesis algorithms
- Uses nonlinear performance curves to quantify performance relative to disturbances of varying magnitudes
- Includes anti-windup algorithms for a class of Euler-Lagrange nonlinear systems
- Traces the history of anti-windup research through an extensive annotated bibliography

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