



Robust Motion Control of Oscillatory-Base Manipulators: H^∞ -Control and Sliding-Mode-Control-Based Approaches (Lecture Notes in Control and Information Sciences)

Masayoshi Toda

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This book provides readers with alternative robust approaches to control design for an important class of systems characteristically associated with ocean-going vessels and structures. These systems, which include crane vessels, on-board cranes, radar gimbals and a conductivity temperature and depth winch, are modelled as manipulators with oscillating bases. One design approach is based on the H-infinity control framework exploiting an effective combination of PD control, an extended matrix polytope and a robust stability analysis method with a state-dependent coefficient form. The other is based on sliding-mode control using some novel nonlinear sliding surfaces. The model demonstrates how successful motion control can be achieved by suppressing base oscillations and in the presence of uncertainties. This is important not only for ocean engineering systems in which the problems addressed here originate but more generally as a benchmark platform for robust motion control with disturbance rejection.

Researchers interested in the robust control of mechanical systems operating on unstable bases will find this monograph valuable. MATLAB® and Simulink® programs are available for download to make the methods described in the text easier to understand and to allow readers to experience practical procedures at first hand.

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