

ASTRODYNAMICS SYMPOSIUM (C1)
Attitude Dynamics (1) (8)

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DYNAMICS AND UNDERACTUATED ROBUST CONTROL OF RIGID-FLEXIBLE COUPLING
TETHERED SYSTEM FOR SPACE DEORBIT

Abstract

The rigid-flexible coupling tethered system for space deorbit is an active removal technology for space debris, which possesses merits, such as low energy consumption, high safety and strong repeatability. The tethered system involves strong couplings, large parametric uncertainties and less anti-interference ability, which poses a challenge for its dynamics and controller design. This paper investigates the dynamics and control problems for rigid-flexible coupling tethered system. In the paper, the model of rigid-flexible coupling tethered system will be established and the stability and motion regularity of tethered system will be revealed. Besides, the feedback linearization technique and hierarchical sliding mode technique will be introduced and a nonlinear robust control approach will be proposed for tethered robot to reduce the influences of nonlinearity and coupling dynamics on the closed-loop control system and thereby reduce the conservatism of the robust controller design. The paper provides a theoretical basis for on-orbit drag technology.