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ATTITUDE DECOUPLING CONTROL FOR ROLLING SPACECRAFT

Abstract

Cryogenic propellant spacecraft rolling about the inertia principal axis can change the heat of spacecraft itself and reduce the propellant transpiration of tanks. However, this will lead to complex nonlinear coupling of control system. For the issues of attitude control of rolling spacecraft, we proposed a scheme for designing of attitude decoupling control system. The proposed control scheme is achieved by simplifying the complex system into two independent subsystems firstly, and then utilizing feedback linearization, an angular-feedback controller and a PD controller are designed for the roll channel and pitch-yaw channel, respectively. To validate the effectiveness of the proposed approach, we apply this approach to a spacecraft with 1deg/s rolling, and simulation results show that the designed controller has good control performance.