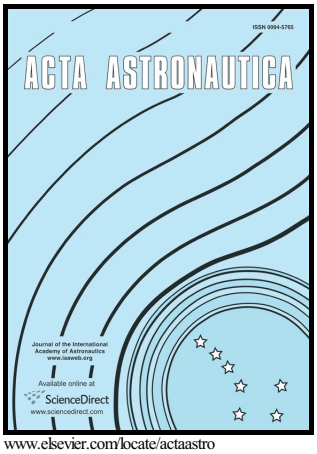

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Coordinated Stabilization for Space Robot after Capturing a Noncooperative Target with Large Inertia

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Abstract

A noncooperative target with large inertia grasped by space robot may contain a large unkonwn initial angular momentum, which will cause the compound system unstable. Unloading the unkonwn angular momentum of the compound system is a necessary and diffcult task. In the paper, a coordinated stabilization scenario is introduced to reduce the angular momentum, which has two stages, Momentum Reduction and Momentum Redistribution. For the Momentum Reduction, a modified adaptive sliding mode control algorithm is proposed and used to reduce the unknown angular momentum of target, which uses a new signum function and time-delay estimation to assure fast convergence and achieve good performance with small chattering effect. Finally, a plane dual-arm space robot is simulated, the numerical simulations show that the proposed control algorithm is able to stabilize a noncooperative target with large inertia successfully, while the attitude disturbance of base is small. The control algorithm also has a good robust performance.

Keywords: Space robot, Large Noncooperative Target, Momentum Reduction, Coordinated Stabilization, Aadaptive Sliding Mode Control.

1. Intronduction

Space robot is one of the most effective methods for on-orbit servicing. Taking into account the economy and complexity of the future mission, a

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