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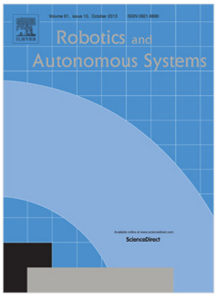

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Reactionless Visual Servoing of a Multi-Arm Space Robot Combined with other Manipulation Tasks

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Abstract

This paper presents a novel and generic reactionless visual servo controller for a satellite-based multi-arm space robot. The controller is designed to complete the task of visually servoing the robot's end-effectors to a desired pose, while maintaining minimum attitude disturbance on the base-satellite. Task function approach is utilized to coordinate the servoing process and attitude of the base satellite. A redundancy formulation is used to define the tasks. The visual serving task is defined as a primary task, while regulating attitude of the base satellite to zero is defined as a secondary task. The secondary task is defined through a quadratic optimization problem, in such a way that it does not affect the primary task, and simultaneously minimizes its cost function. Stability analysis of the proposed control methodology is also discussed. A set of numerical experiments are carried out on different multi-arm space robotic systems. Theses systems are a planar dual-arm robot, a spatial dual-arm robot, and a three-arm planar robot. The results of the simulation experiments show efficacy, generality and applicability of the proposed control methodology.

Key words: Visual servoing

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