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A NOVEL MANIPULATOR'S TRAJECTORY PLANNING FOR FREE-FLYING SPACE ROBOT

Abstract

Free-flying space robot is more and more important in space operation, especially the manipulator mounted on the space robot. Classical space manipulator's trajectory planning is utilized its precise kinematics model. so when a redundant manipulator or many manipulators cooperatively carry out a task, classical trajectory planning approach is difficult because it is complicated to get the precise kinematics model. This paper presents a novel approach in order to autonomously plan manipulator's trajectory for space robot. This approach is based on Multi-agent system and Markov process. In the paper, each manipulator's link is considered as an agent, each rotary agent(a link contained a rotary joint) only know its own velocity, angle and link's length. Entire Manipulator is considered as a multi-agent system(MAS)which is able to autonomously decides each agent how to move in accordance with Markov process. For an agent, MAS is its environment. Each agent can get and affect manipulator's kinematic state. The simulation and experiment demonstrate that the novel approach is flexible and effective, and is able to use for a non-redundant and redundant manipulator.