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ADAPTIVE COORDINATION CONTROL OF FREE-FLYING SPACE ROBOT IN POST-CAPTURE
OF A NON-COOPERATIVE TUMBLING TARGET

Abstract

This paper presents an adaptive coordination control scheme for a free-flying space robot (FFSR) in the post-capture so as to bring the non-cooperative tumbling target to rest. Firstly, we build the coupled dynamic model between the FFSR and the target. Furthermore, a coordination controller is developed so that the space manipulator moves the target according to a desired trajectory while regulating the attitude of its base to pointing the earth. Then, considering the model inaccuracies in the non-cooperative target, an adaptive law is designed based on Chebyshev neural networks. The adaptive coordination controller is analyzed by using Lyapunov stability theorem. Finally, a numerical simulation is carried out to verify the operational performance of the proposed method in the presence of model uncertainly.