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FUZZY WAVELET CMAC NEURAL NETWORK CONTROL FOR FREE-FLOATING SPACE FLEXIBLE MANIPULATOR TO TRACK DESIRED TRAJECTORY

Abstract

Space manipulator system will play more and more important function in future space activities, and its research get the attention of all parties. However, with the development of space technology and continuous improvement of modern robot manufacture technology, late-model space robot will progress in the direction of lightsome, high speed and high precision, and concerned dynamics and control problems on flexible space robot will become the hot topics for people to discuss. The trajectory tracking control for coordinated motion of free-floating space flexible manipulator with unknown parameters is developed. With the law of conservation of momentum, the Lagrange equation of the second kind is utilized to model the dynamic function of the space flexible manipulator incorporating the assumed modes method. Base on above, in case of system parameters are unknown, a fuzzy wavelet CMAC neural network control scheme is designed. The control scheme can control the base attitude and joint angle of manipulator to track desired trajectories in joint space at the same time. The control scheme not only requires no a priori knowledge about the dynamic model and system parameters, but also saves the off-line training time because of the network weights are adjusted through online learning. Simulation result demonstrates the valid and feasible of the proposed control scheme. This paper work is supported by the National Natural Science Foundation of China (Grant No.11072061)