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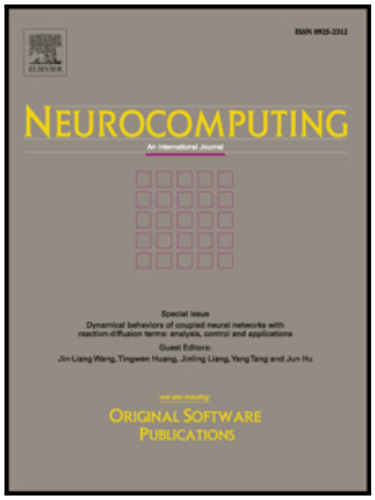

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Prescribed performance adaptive fault-tolerant tracking control for nonlinear time-delay systems with input quantization and unknown control directions

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Abstract

This paper addresses the adaptive prescribed performance tracking control problem for a class of nonlinear time-delay systems with actuator fault, input quantization, unknown control directions and disturbances. Neural networks (NNs) are employed to approximate the unknown nonlinear functions and the Nussbaum function is used to deal with the unknown control directions. Then, a novel adaptive prescribed performance controller is designed to reduce the effects of actuator fault, input quantization, NNs approximation errors and disturbances. Compared with the existing results, a new error transformation method is presented, and the knowledge of the quantization parameters and the control directions are unknown in the control design. Furthermore, the proposed control scheme can guarantee the semi-global boundedness of all the closed-loop signals and the prescribed time-varying tracking performance. Finally, simulation results are given to demonstrate the effectiveness of the proposed control method.

Keywords: Fault-tolerant control (FTC), Input quantization, Neural network (NN), Nonlinear time-delay systems, Prescribed performance, Unknown control directions

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