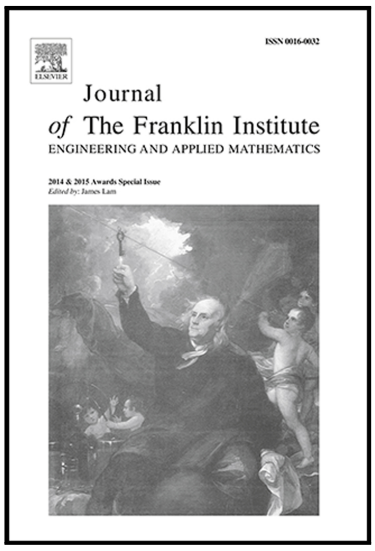

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Decentralized low-complexity tracking of uncertain interconnected high-order nonlinear systems with unknown high powers

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Abstract

A global decentralized low-complexity tracker design methodology is proposed for uncertain interconnected high-order nonlinear systems with unknown high powers. It is assumed that interconnected nonlinearities are bounded by completely unknown nonlinearities, rather than, a linear combination of high-ordered state variables. Compared with the existing decentralized results for interconnected nonlinear systems with known high powers, the decentralized robust controller, which achieves the pre-designable transient and steady-state tracking performance for each subsystem, is designed by employing nonlinear error surfaces with time-varying performance functions, regardless of unknown nonlinear interactions and high powers related to virtual and actual control variables. The proposed decentralized continuous robust low-complexity tracker is realized without the use of any adaptive or function approximation techniques for estimating unknown parameters and nonlinearities. The stability and preassigned tracking performance of the resulting decentralized low-complexity control system are thoroughly analyzed in the Lyapunov sense. Finally, simulation results on coupled underactuated mechanical systems are provided to show the effectiveness of the proposed theoretical result.

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