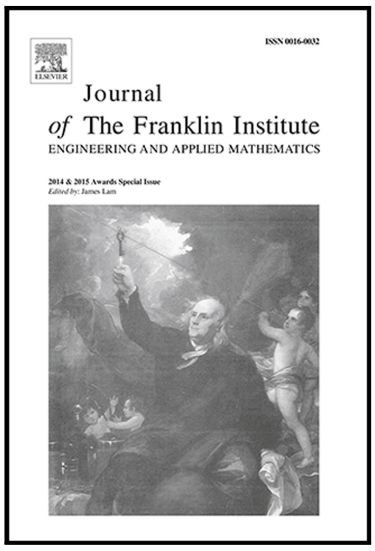

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Approximation-based decentralized output-feedback control for uncertain stochastic interconnected nonlinear time-delay systems with input delay and asymmetric input saturation

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Abstract

This paper proposes an adaptive observer-based neural controller for a class of uncertain large-scale stochastic nonlinear systems with actuator delay and time-delay nonlinear interactions, where drift and diffusion terms contain all state variables of their own subsystem. First, a state observer is established for estimating the unmeasured states, and a predictor-like term is utilized to transform the input delayed system into the delay-free system. Second, novel appropriate Lyapunov-Krasovskii functionals are used to compensate the time-delay terms, and neural networks are employed to approximate the unknown nonlinear functions. At last, an output feedback adaptive neural control scheme is constructed by using Lyapunov stability theory and backstepping technique. It is shown that the designed neural controller can ensure that all the signals in the closed-loop system are semi-globally uniformly ultimately bounded (SGUUB) and the tracking error is driven to a small neighborhood of the origin. The simulation results are presented to further show the effectiveness of the proposed approach.

Keywords: Decentralized adaptive neural control, Stochastic nonlinear time-delay systems, Input delay, Output-feedback control, Asymmetric input saturation

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