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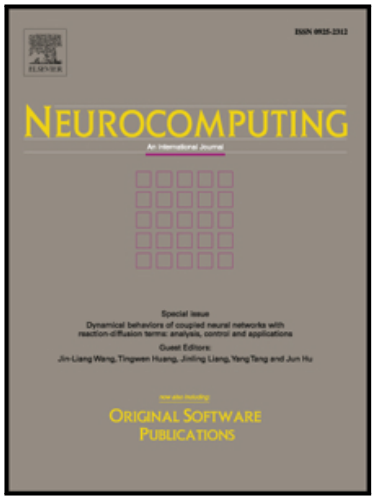

Adaptive Fuzzy Funnel Control for a Class of Strict Feedback Nonlinear Systems

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Adaptive Fuzzy Funnel Control for a Class of Strict Feedback Nonlinear Systems

Xiaoping Liu, Huanqing Wang, Chuang Gao, and Ming Chen ‡

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Abstract

In this paper, a constraint control problem is considered for strict feedback nonlinear systems. On the basis of backstepping design procedure, a system transformation is carried out by introducing a new constraint variable. By utilizing fuzzy approximation, an adaptive fuzzy controller with prescribed constraint is designed to ensure the transient and steady state performance for the tracking errors of nonlinear system. The stability analysis proves that all signals in the closed-loop system are semi-globally, uniformly and ultimately bounded. The simulation results show that the proposed controller has a better transient and steady state performance than that of the existing constraint controllers.

Keywords: Adaptive fuzzy control, Backstepping, Funnel control, Nonlinear system

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