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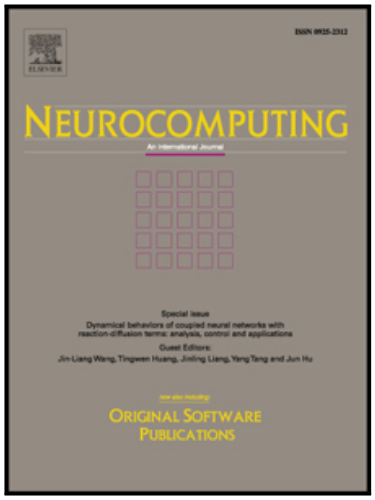

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Robust fuzzy adaptive funnel control of nonlinear systems with dynamic uncertainties*

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Abstract: This paper focuses on the problem of adaptive funnel control for strict-feedback nonlinear systems with unmodeled dynamics. To present a control scheme with prescribed performance bounds on tracking errors, an improved funnel error transformation is introduced and merged into the controller design. Fuzzy logic systems are employed to handle uncertain nonlinear functions, an adaptive fuzzy funnel controller is constructed via backstepping. It is proven that the presented controller ensures that all the signals in the closed-loop system are semi-globally uniformly ultimately bounded and the tracking error evolves within a pre-specified performance funnel. The developed control method is verified through one numerical example.

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

1 Introduction

During the past decades, there has been a rapid growth of research efforts aimed at the development of systematic design methods for the adaptive control of nonlinear systems with parametric uncertainty. Adaptive backstepping control, which was first presented for nonlinear control in [1], has got a great development in nonlinear control field. Adaptive

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