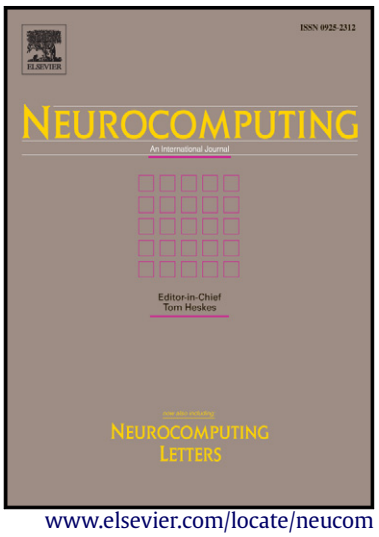

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Abstract

The adaptive tracking control problem is considered for a class of nonlinear time-delay systems in the presence of input and tracking error constraint. An reduced-order observer is designed to estimate the unmeasured state variables at first. Then, a constraint variable is utilized to ensure that the tracking error is within the prescribed boundaries. An auxiliary state is introduced to deal with the input saturation constraint. With the time-delay functions unavailable, we employ adaptive RBF neural network systems to approximate unknown functions. It is proved that the resulting closed-loop system is stable in the sense of semiglobal uniformly ultimately boundedness. The simulations are performed and the results demonstrate the effectiveness of the proposed approach.

Keywords: Tracking control; Time-delay systems; Input constraint; Error constraint; RBF neural network

1. Introduction

Time-delay exists in a variety of practical systems, for example, teleoperation systems, electrical networks and so on. The existence of time-delay is an unavoidable factor affecting the stability of the closed-loop system. It also makes the controller design more difficult([1, 2]). Hence, the research for time-delay systems is one of the most meaningful and challenging problems. Meanwhile, rapid progress has been made on the problem of stability analysis and control for time-delay systems, see [2, 3, 4, 5] and the references therein.