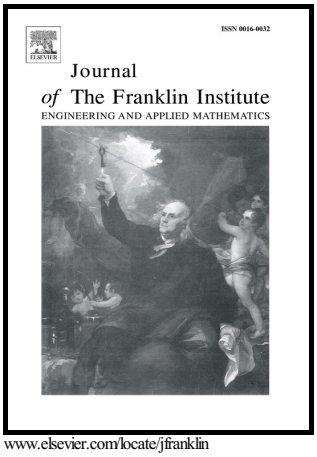

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Adaptive tracking control for uncertain switched nonlinear systems in nonstrict-feedback form

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Abstract

This paper investigates an adaptive tracking problem of a class of uncertain switched nonlinear systems in nonstrict-feedback form with arbitrary switchings. Switched nonstrict-feedback nonlinearities, switched control coefficient functions, and external disturbances are considered and assumed to be unknown. Compared with existing literature, a main contribution of this paper is to design a common adaptive control scheme in the presence of unknown switched nonstrict-feedback nonlinearities related to all state variables and arbitrary switchings. Based on the common Lyapunov function method and the dynamic surface design technique, a common adaptive tracking scheme is constructed and the finite-time stability of the controlled closed-loop system is analyzed. It is shown that the tracking errors converge to an adjustable neighborhood of the origin in finite time. Finally, simulation results are provided to show the effectiveness of the proposed methodology.

Keywords: Switched nonlinear systems, nonstrict-feedback, common Lyapunov function, dynamic surface design

1. Introduction

There has been a lot of interest in the control synthesis and stability analysis of switched systems due to many practical applications such as networked control systems, robot systems, switching power systems, and so on [5, 6, 7, 10, 27]. Research results on switched systems have been greatly

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