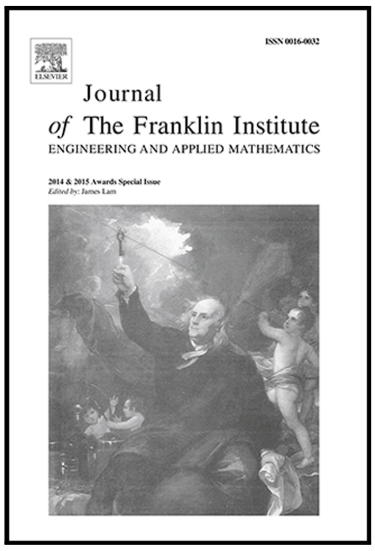

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Adaptive fuzzy tracking control for a class of high-order switched uncertain nonlinear systems

Xinyong Wang[a], Hongmin Li[a], Guangdeng Zong[b], Xudong Zhao[c,a]

[a] *College of Engineering, Bohai University, Jinzhou 121013, Liaoning, China.*
[b] *School of Engineering, Qufu Normal University, Rizhao 276826, China.*
[c] *Faculty of Electronic Information and Electrical Engineering, Dalian University of Technology, Dalian 116024, Liaoning, China.*

Abstract

In this paper, adaptive fuzzy tracking control is investigated for a class of high-order switched nonlinear systems. The considered systems possess the characteristic of completely unknown nonlinear functions and arbitrary switchings. An efficient fuzzy adaptive control method is established by combining the common Lyapunov function method with adding a power integrator approach. A common assumption that is widely used in high-order nonlinear systems with or without switching is removed. Because the unknown nonlinearities can be approximated by using fuzzy logic systems, our proposed method is more flexible and applicable. Furthermore, some effective parameters are introduced such that the obtained results can guarantee that the practical output tracking performance can be realized via easily tuning the controller design parameters. On the other hand, to solve the problem of over-parameterization, a result with only one adaptive law is given. Finally, simulation results are addressed to show the effectiveness of the theoretical approaches.

Keywords: High-order switched nonlinear systems, tracking control, fuzzy approximator.

1. Introduction

During the past decades, switched nonlinear systems have received a lot of attention. They are a special class of hybrid systems, see, e.g., [1, 2, 3, 4, 5, 6, 7, 8, 9] and the references therein. The switched system consists of a group of subsystems and a switching signal which assigns an active subsystem at each

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Email addresses: wangxinyong1993@gmail.com (Xinyong Wang), fslihongmin@gmail.com (Hongmin Li), lovelyletian@gmail.com (Guangdeng Zong), xdzhaohit@gmail.com (Xudong Zhao)