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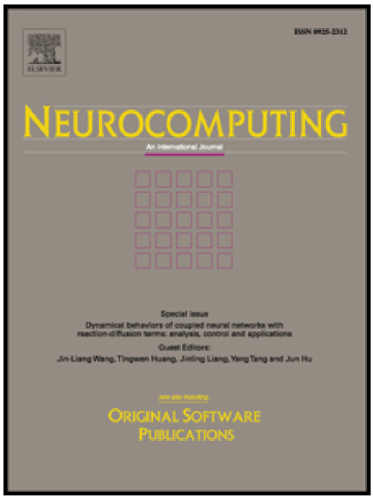

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Adaptive Consensus Control of Output-Constrained Second-order Nonlinear Systems via Neurodynamic Optimization

Yang Yu[a,b], Wei Wang[b], and Kang-Hyun Jo[a*]

[a] *School of Electrical Engineering, University of Ulsan;*
[b] *School of Electrical Engineering, Liaoning University of Technology*

Corresponding author: Kang-Hyun Jo.

Abstract

This paper is concerned with the adaptive consensus control of second-order nonlinear systems with output constraints guided by an active leader. Backstepping design combining with fuzzy approximate technique is employed in the consensus control design. Specifically, a command governor is introduced to generate an optimal virtual control signal, which is able to balance the virtual control law and the actual velocity signal. The optimization problem is solved via a recurrent neural network. A barrier Lyapunov function is utilized in the stability analysis to guarantee the uniformly ultimately bounded control of the closed-loop systems without violating the output constraints. Simulation results are performed to illustrate the effectiveness of the proposed adaptive consensus control method.

Keywords: Adaptive consensus control, Fuzzy approximate, Neurodynamic optimization, Output constraint.

1. Introduction

Coordination of multi-agent systems has attracted an increasing interest over the past decades, because of its wide applications in various fields, such as formation control, flocking and wireless sensor networks [1]-[3]. Consensus is a fundamental problem in coordination of multi-agent systems, whose aim is to drive all agents to reach an agreement using the local information exchanged among individuals. Most of the consensus approaches can be