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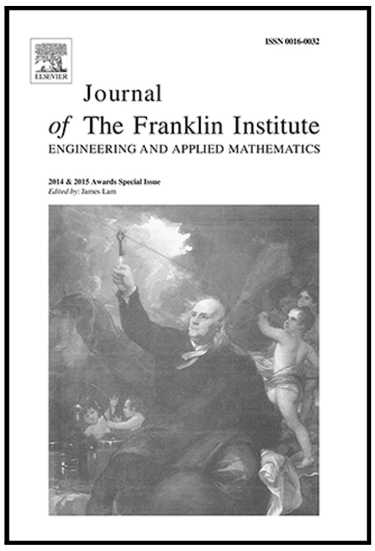

Finite-time Consensus for Nonlinear Multi-agent Systems with Time-varying Delay: An Auxiliary System Approach

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Finite-time Consensus for Nonlinear Multi-agent Systems with Time-varying Delay: An Auxiliary System Approach

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Abstract

This paper investigates the finite-time consensus problem of uncertain nonlinear multi-agent systems with asymmetric time-varying delays and directed communication topology. An auxiliary system is firstly designed to deal with the continuous or discontinuous time-varying communication delays. Based on the finite-time input-to-output framework, a novel consensus scheme relying on local delayed information exchange is proposed. Moreover, by utilizing an auxiliary integrated regressor matrix and vector method, the system uncertainties can be accurately estimated. Then the consensus of multi-agent systems can be achieved within finite time by selecting the control gains simply. Finally, numerical simulations are provided to demonstrate the effectiveness of the proposed control algorithms.

Keywords: Multi-agent systems, finite-time consensus, asymmetric time-varying delay, ISS

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