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Consensus Problem in Multi-agent Systems under Delayed Information[☆]

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Abstract

This paper studies the consensus problem of first-order multi-agent systems with unknown communication delay. Given unstable agent dynamics and directed network topology, consensus conditions upon two kinds of communication delays are provided. When the relative information is affected by delay, an allowable delay bound for consensus is obtained; if delay influences neighbors' transmitted information, sufficient consensus condition admitting any large yet bounded delay is acquired. It is observed in particular that when the network topology is undirected, the delay is allowed to be time-varying. Finally, two numerical examples are carried out to demonstrate the effectiveness of the theoretical results.

Keywords: Consensus, protocol, multi-agent systems, communication delay.

1. Introduction

Recently, distributed coordination of multi-agent systems([1],[2]) has witnessed an increasing attention due to its broad applications, such as formation control[3], sensor networks[4] and mobile robots[5]. As one of the most fun-

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