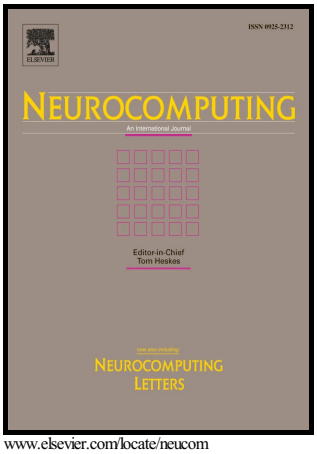

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Consensus of fractional-order multi-agent systems with linear models via observer-type protocol

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Abstract In this paper, the consensus of fractional-order multi-agent systems with general linear models is investigated , where the fractional-order α satisfies $0 < \alpha \leq n$ for any given natural number n. A distributed observer-type protocol is proposed. By applying the fractional-order stability theory, properties of the Kronecker product, Mittag-Leffler function and Laplace transform, a sufficient condition is obtained under the assumption that each agent is stabilizable and detectable. Finally, a numerical simulation is presented to illustrate the usefulness of the theoretical result, which shows that the result obtained in this paper generalizes and improves some existing results in literature.

Keywords Consensus; Fractional-order; Multi-agent systems; Observer-type protocol

1 Introduction

Cooperative control of a group of agents has received great attention from various scientific communities. Consensus is an important and fundamental problem for cooperative control of multi-agent systems(MASs), which has broad applications in many fields such as multi-vehicle systems [1], swarms and flocks [2], etc.

In nature, many systems cannot be well explained with integer-order models, such as electromagnetic waves, underwater vehicles operating in lentic lakes [3, 4]. The consensus of MASs with fractional-order dynamics

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