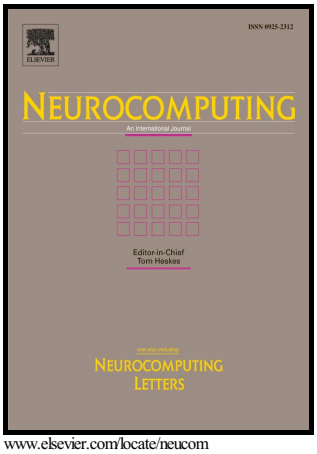

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Robust Consensus of Fractional Multi-agent Systems with External Disturbances

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Abstract: In this paper, the problem of robust consensus for fractional multi-agent systems with external disturbances is investigated over a directed fixed interaction graph. Based on Mittag-Leffler stability theory and the inequality techniques, both linear and nonlinear systems are considered. Firstly, for fractional linear multi-agent systems, it is shown that consensus can be achieved asymptotically in the absence of disturbances. In the presence of disturbances, the steady-state errors of any two agens can reach a small region determined by the bound of disturbances. Secondly, for fractional nonlinear multi-agent systems, a pinning control input is proposed such that robust consensus can be realized. Finally, the numerical simulations are given to verify the correctness of the presented theories.

Keywords: Robust consensus; Fractional; Multi-agent; External disturbances; Pinning control

1 Introduction

In recent years, the research of multi-agent systems has become a hot issue in the engineering community. The multi-agent system which is composed of multiple interacting agents can be used to solve problems that are difficult or impossible for an individual agent to solve. As a mian research direction of multi-agent systems, the distributed coordination has received considerable attention of many researchers. The objective of the distributed coordination is to achieve collective group behavior through local interaction. And the distributed coordination has a large number of applications, such as rendezvous [1], flocking [2], formation [3,4] and consensus [5-11], and so on.

Particularly, consensus plays an important role in the distributed coordination. The basic idea of consensus is that each agent updates its state based on the states of its neighbors and its own such that

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