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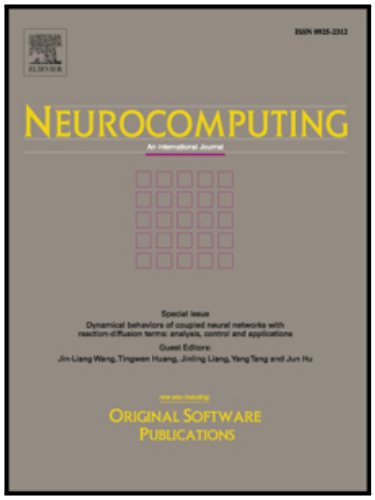

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Couple-Group Consensus for Discrete-Time Heterogeneous Multiagent Systems with Cooperative-Competitive Interactions and Time Delays

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Abstract

We investigate couple-group consensus problems for a class of discrete-time heterogeneous systems consisting of first-order and second-order agents under the influence of communication and input time delays. A novel consensus protocol is designed by utilizing cooperative and competitive interactions among agents, so that we solve the couple-group consensus problems casting off a conservation condition of in-degree balance which widely exists in relevant articles. Based on frequency-domain analysis and matrix theory, some sufficient conditions are derived to ensure the achievement of group consensus in some cases, and the upper bound of input time delays are consequently estimated. The results show that the achievement of couple-group consensus is closely relate to the coupling weights between the agents, the control parameters of the systems, the sampled information of discrete-time systems as well as the agents' input time delays, while it is irrelevant to communication delays. Finally, we provide several simulations to illustrate the correctness of the theoretical results.

Keywords: Discrete-time, Heterogeneous multi-agent systems, Couple-group consensus, Cooperative-Competitive interaction, Time delays

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