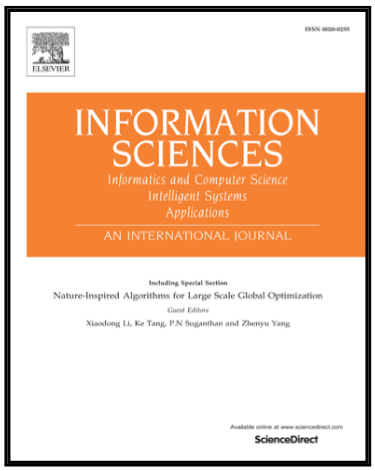

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Adaptive guaranteed-performance consensus design for high-order multiagent systems☆

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Abstract

The current paper investigates the distributed guaranteed-performance consensus design problems for high-order linear multiagent systems with leaderless and leader-follower structures, respectively. The information about the Laplacian matrix of the interaction topology or its minimum nonzero eigenvalue is usually required in existing works on the guaranteed-performance consensus, which means that their conclusions are not completely distributed. A new translation-adaptive strategy is proposed to realize the completely distributed guaranteed-performance consensus control by the structure feature of a complete graph in the current paper. For the leaderless case, an adaptive guaranteed-performance consensualization criterion is given in terms of Riccati inequalities and a regulation approach of the consensus control gain is presented by linear matrix inequalities. Extensions to the leader-follower cases are further investigated. Especially, the guaranteed-performance costs for leaderless and leader-follower cases are determined, respectively, which are associated with the intrinsic structure feature of the interaction topologies. Finally, two numerical examples are provided to demonstrate theoretical results.

Keywords: Multiagent systems, adaptive consensus, guaranteed-performance control, gain regulation.

1. Introduction

In the past few years, the distributed cooperative control of multiagent systems has received great attention by researchers from different fields, such as formation control, multiple mobile robot systems, distributed computation, spacecraft clusters and distributed

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