

Topology Uniformity Pinning Control for Multi-agent Flocking

Jintao Liu¹, Ming He¹, Qiang Liu¹, Jie Wang², Mingguang Zou¹, and Weishi Zhang¹

¹Peoples Liberation Army Engineering University

²Naval Aviation University

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Abstract

The optimal pinning node selection for multi-agent flocking is a NP-hard problem. The current pinning node selection strategies mainly depend on complex network node characteristics which are lack of rigorous mathematical proof for flocking control. This paper studies the effect and selection strategy of pinning node based on matrix eigenvalue theory. Firstly, the effect on the eigenvalue of Laplacian matrix by pinning node is analyzed. Secondly, the synchronization index which reflects topology uniformity of multi-agent system is proposed to exert maximum influence on the system synchronizability. A practicable optimal pinning node selection method based on synchronization index is proposed and analyzed by the eigenvalue perturbation method. Finally, the simulations show the rate of system convergence by using optimal synchronizability pinning node is better than the maximum degree centrality.

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