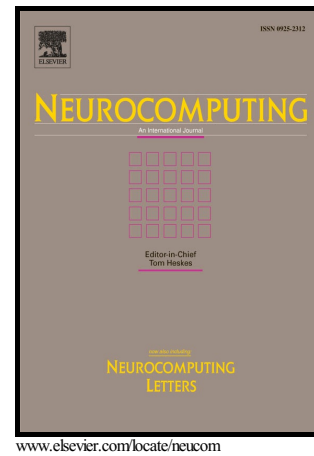# Author's Accepted Manuscript

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Synchronization of Complex Dynamical Networks via Pinning Scheme Design under Hybrid Topologies

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Abstract

In this paper, the synchronization problem of complex networks is investigated by pinning control method. A kind of novel hybrid topologies is presented, which includes directed network and undirected network. Under the hybrid topologies, the pinning controllers on the chosen nodes of undirected network are designed to reach synchronization behavior with convex combination of the nodes in direct network. The synchronization criterion is established for reaching pinning control on networks. The results can also extend to networks of networks. The pinning scheme is designed by Cholesky Decomposition and triangularization, which shows that the nodes with low degrees and high degrees should be controlled.

Keywords: Complex networks, pinning control, synchronization, hybrid topologies, Cholesky Decomposition.

1. Introduction

Complex networks are used to describe a variety of systems in the real world, such as electricity grid, internet, communication network, social network, etc, which have attracted much attention [8-11]. The diversity of construction and dynamical characteristics of nodes lead to the complexity of the networks [26-27, 34-35]. Synchronization, as one of the most important phenomena of complex dynamical networks, has achieved a lot of

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