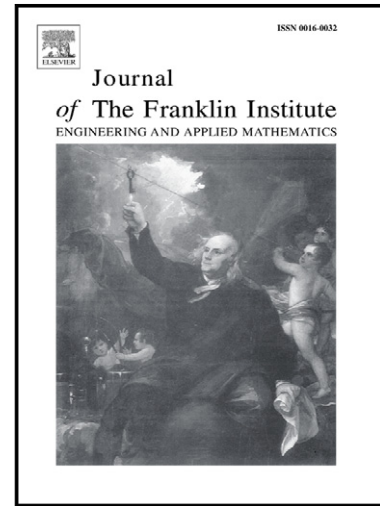


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# Inner and outer synchronization between two coupled networks with interactions

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## Abstract

In this paper, we study two types of synchronization between two coupled networks with interactions, including inner synchronization inside each network and outer synchronization between two networks with the adaptive controllers. By Barbalat's lemma and linear matrix inequality (LMI), we obtain a sufficient condition for each network to be asymptotic stability in terms of LMI. When the inner synchronization happens inside each network, while outer synchronization does not appear, we design the adaptive controllers to realize the inner and outer synchronization simultaneously, and investigate the identical or nonidentical coupling and interactive matrices. We then obtain a theorem for the outer synchronization with the adaptive controllers. Finally we give some numerical examples to show the effectiveness of our obtained results. Our findings would provide insights into the dynamics of coupled networks with diverse connections.

**Keywords:** Complex network, Inner synchronization, Outer synchronization

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