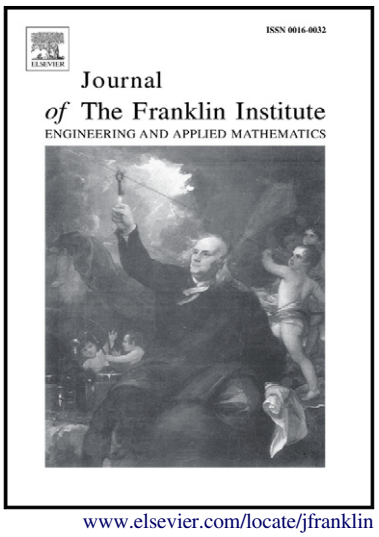

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Partial-Information-Based Synchronization Analysis for Complex Dynamical Networks☆

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Abstract

The model of complex dynamical networks with partial information transmission is introduced. Unlike existing complex network models, the information transmission between the nodes is assumed to have an imperfect physical condition — only partial information can be transmitted. Furthermore, for varying connections, the partly transmitted information can be completely distinct. This communication constraint makes the network harder to achieve synchronization. To reflect a more practical situation, we consider the complex networks with two typical kinds of inner coupling matrix: diagonal matrix and lower triangle matrix, respectively. By using an efficient decomposition method, some synchronization criteria are then derived for the complex networks with partial information transmission. Finally, a complex network with chaotic dynamics is constructed as an example to illustrate the effectiveness of the proposed results.

Keywords: Complex dynamical network; Partial information transmission; Synchronization.

1. Introduction

Complex dynamical networks are ubiquitous in our real world, ranging from biological, physical, to social networks [1, 2, 3]. The model of complex network is regarded as a set of interconnected nodes, in which the node has its own dynamical behaviour. Over the past decade, much interesting dynamical behaviour of complex dynamical networks, such as synchronization, spatio-temporal chaos, auto-waves and spiral waves, has attracted increasing attention from researchers in different areas. In particular, synchronization has been a hot research topic in recent years [4, 5, 6, 7].

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