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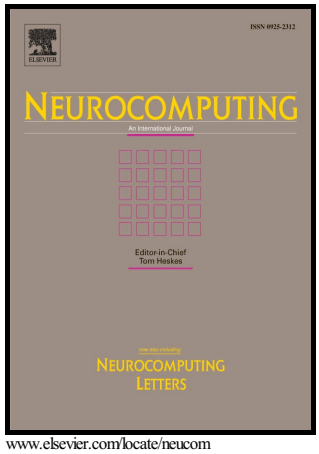

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Generalized matrix projective outer synchronization of non-dissipatively coupled time-varying complex dynamical networks with nonlinear coupling functions

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Abstract

This paper investigates the generalized matrix projective outer synchronization (GMPOS) between two non-dissipatively coupled time-varying complex dynamical networks via open-plus-closed-loop dynamical compensation controllers. To be more consistent with the real-world networks, besides non-dissipatively couplings, the drive and response networks in our paper can possess different nodes, different time-varying outer coupling configuration matrices and different nonlinear inner coupling functions. Thus, our network models are more general and extensive than almost all of those in the existing literatures about outer synchronization of networks. In order to make our drive and response networks realize the GMPOS, the open-plus-closed-loop dynamical compensation controllers are designed based on the Lyapunov stability theory and Barbalat's lemma. Moreover, the speed of achieving the GMPOS between two networks can be improved by adjusting the parameters in our dynamical compensation systems. A simulation example with different hyperchaotic nodes is given to verify the effectiveness and feasibility of our theoretical results.

Keywords: Complex dynamical network, GMPOS, non-dissipatively coupled, time-varying, nonlinear coupling functions

1. Introduction

Complex dynamical networks, such as biological neural networks, communication networks, the World Wide Web, traffic networks, are ubiquitous in our daily life.