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# State feedback controller design for the synchronization of Boolean networks with time delays

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## Abstract

State feedback control design to make the response Boolean network synchronize with the drive Boolean network is far from being solved in the literature. Motivated by this, this paper studies the feedback control design for the complete synchronization of two coupled Boolean networks with time delays. A necessary condition for the existence of a state feedback controller is derived first. Then the feedback control design procedure for the complete synchronization of two coupled Boolean networks is provided based on the necessary condition. Finally, an example is given to illustrate the proposed design procedure.

*Keywords:*

Boolean network, time delay, semi-tensor product, feedback control design.

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## 1. Introduction

Recently, the study of logical systems has attracted attention, because it can provide a simple and proper model to describe genetic regulatory networks, neural networks, etc, [1–4]. Boolean networks (BNs) as a kind of two valued logical system has been studied widely [5–7]. In a Boolean network, the state of each Boolean variable is 1 or 0, which means the state is on or off. Every Boolean variable updates its state according to a logical relationship,

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