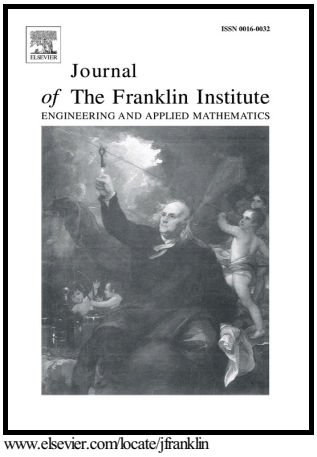

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State estimation of neural networks with two Markovian jumping parameters and multiple time delays

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Abstract

This paper studies the problem of state estimation for two Markovian jumping neural networks with leakage, discrete and distributed delays. The Markovian jumping parameters in connection weight matrices and discrete time-varying delay are assumed to be different. By constructing an appropriate Lyapunov-Krasovskii functional and combining with the reciprocally convex approach and Wirtinger-based integral inequality (this inequality gives a tighter upper bound), some sufficient conditions are established. They guarantee that the estimation error converges to zero exponentially in the mean square sense. Compared with existing results, the obtained criteria are more effective due to the application of Matrix decomposition method which sufficiently utilizes the information of Lyapunov matrices. Numerical examples and simulations are given to demonstrate the reduced conservatism and effectiveness of the proposed method.

Keywords: Leakage delay; State estimation; Markovian jumping parameters; Matrix decomposition method.

1. Introduction

Over the past decades, neural networks have gained increasing attention because of their successful applications, including signal processing, associative memories, combinatorial optimization and so on [1-4]. The law of system development is not only depends on current states, but also depends on previous states, which is called delay phenomenon. However, the existence of time delay has been recognized as one of the major source of instability and poor performance of network dynamics. Therefore, there are a lot of graceful results about the stability of delayed neural networks [5-10]. In particular, distributed delay [5, 10] should be added to the considered neural networks since neural networks have a quantity of parallel pathways with various axon sizes and lengths, and signal transmission is distributed for some time.

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