

[2009-0481] A Fast Averaging Synchronization Algorithm for Clock Oscillators in Nonlinear Dynamical Network with Arbitrary Time-delays

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摘要

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Abstract

This paper investigates the synchronization problem of clock oscillators in nonlinear dynamical network with arbitrary time-delays. Firstly, a dynamic synchronization algorithm based on consensus control strategy, named Fast Averaging Synchronization Algorithm (\mathbf{FASA}), is presented to find a solution to the synchronization problem. This algorithm can compensate the clock skew and offset differences between clock nodes, achieving the synchronization of clock nodes in a shorter time in contrast to previous synchronization method. Secondly, because of the dynamical performance of \mathbf{FASA} , it is characterized from the perspective of compartmental dynamical system with arbitrary time-delays. In this case, the algorithm guarantees the states of all clock nodes in dynamical network converge to Lyapunov stable equilibria. Finally, numerical simulations and experimental results demonstrate the correctness and efficiency of the \mathbf{FASA} , which means that the clock nodes can reach global consensus, and the accuracy of synchronization error can reach nanosecond order of magnitude.

Key words

[Clock synchronization](#) [dynamical network](#) [arbitrary time-delays](#) [consensus algorithm](#)

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