Exponential stability of inertial BAM neural network with time-varying impulses and mixed time-varying delays

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Abstract

The present article is investigating the effects of time-varying impulses on exponential stability to a unique equilibrium point of inertial BAM neural networks with mixed time-varying delays. A suitable variable transformation is chosen to transform the original system into the system of first order differential equation. The fixed point theory of homeomorphism has been implemented to find the distributed delay-dependent sufficient condition which assured the system has a unique equilibrium point. In order to study the impulsive effects on stability problems, the time-varying impulses including stabilizing and destabilizing impulses are considered with the transformed system. Based on the matrix measure approach and the extended impulsive differential inequality for a time-varying delayed system, we have derived sufficient criteria in matrix measure form which ensure the exponential stability of the system towards an equilibrium point for two classes of activation functions. Further, different convergence rates of the system's trajectories have been discussed for the cases of time-varying stabilizing and destabilizing impulses using the concept of an average impulsive interval. Finally, the efficiency of the theoretical results has been illustrated by providing two numerical examples.

Keywords: Inertial BAM neural network, Time-varying impulses, Mixed delays, Matrix measure.