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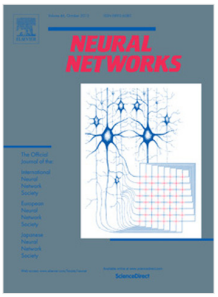

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Decomposition approach to the stability of recurrent neural networks with asynchronous time delays in quaternion field

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Abstract

In this paper, the global exponential stability for recurrent neural networks (QVNNs) with asynchronous time delays is investigated in quaternion field. Due to the non-commutativity of quaternion multiplication resulting from Hamilton rules: $ij = -ji = k$, $jk = -kj = i$, $ki = -ik = j$, $ijk = i^2 = j^2 = k^2 = -1$, the QVNN is decomposed into four real-valued systems, which are studied separately. The exponential convergence is proved directly accompanied with the existence and uniqueness of the equilibrium point to the consider systems. Combining with the generalized ∞-norm and Cauchy convergence property in the quaternion field, some sufficient conditions to guarantee the stability are established without using any Lyapunov-Krasovskii functional and linear matrix inequality. Finally, a numerical example is given to demonstrate the effectiveness of the results.

Keywords: Global exponential stability, quaternion-valued neural network, asynchronous time delay, linear matrix inequality

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