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Jinling Wang, Haijun Jiang, Tianlong Ma, Cheng Hu

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Delay-dependent dynamical analysis of complex-valued memristive neural networks: continuous-time and discrete-time cases

Jinling Wang¹, Haijun Jiang¹, Tianlong Ma², Cheng Hu¹

¹ College of Mathematics and System Sciences,

Xinjiang University, Urumqi, 830046, Xinjiang, China

² College of Basic Research,

Qinhai University, Xining, 810016, Qinghai, China

Abstract: This paper considers the delay-dependent stability of memristive complex-valued neural networks (MCVNNs). A novel linear mapping function is presented to transform the complex-valued system into the real-valued system. Under such mapping function, both continuous-time and discrete-time MCVNNs are analyzed in this paper. Firstly, when activation functions are continuous but not Lipschitz continuous, an extended matrix inequality is proved to ensure the stability of continuous-time MCVNNs. Furthermore, if activation functions are discontinuous, a discontinuous adaptive controller is designed to acquire its stability by applying Lyapunov-Krasovskii functionals. Secondly, compared with techniques in continuous-time MCVNNs, the Halanay-type inequality and comparison principle are firstly used to exploit the dynamical behaviors of discrete-time MCVNNs. Finally, the effectiveness of theoretical results are illustrated through numerical examples.

Keywords: Memristor; Complex-valued neural networks; Discontinuous activation functions; Matrix inequalities; Delay-dependent stability.

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