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Anti-Synchronization of Enzymes-Substrates Biological Systems via Adaptive Backstepping Control

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Abstract: In the recent decades, there is significant interest in the literature in the application of chaos in physical, electrical, chemical and biological systems. This paper investigates research in the dynamic analysis and global chaos synchronization of enzymes-substrate reactions system with ferroelectric behaviour in brain waves which was studied by Enjieu Kadji, Chabi Orou, Yamapi and Wofo (2007). The enzymes-substrates system is a 2-D non-autonomous system with a cosinusoidal forcing term. This paper depicts the phase portraits of the 2-D enzymes-substrates system when the system undergoes chaotic behaviour. Next, this paper derives new results for the global chaos anti-synchronization of the identical enzyme-substrates biological systems with uncertain parameters via backstepping control method. The main control result derived in this work is proved using Lyapunov stability theory. MATLAB plots have been shown in this paper to illustrate the main results for the enzyme-substrates system.

Keywords: Chaos, enzymes-substrate reactions, biology, anti-synchronization, backstepping control, etc.

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