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Complex Dynamics of Novel Chaotic System with No Equilibrium Point: Amplitude Control and Offset Boosting Control, Its Adaptive Synchronization

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Abstract: In this paper, a novel chaotic system with dissipative nature is introduced. In the proposed system, a conservative system can be modified to a dissipative system by adding a linear term. The chaotic dynamics of the new system such as Lyapunov exponents, Lyapunov dimensions, Poincare plots and attractor plots are verified through numerical simulations. The dynamical analysis is also conducted to verify the existence of chaotic attractors for the particular system parameters. It is found that the amplitude and position of the proposed chaotic attractors can be controlled. The numerical simulations revealed that the new system has many complex dynamics which can be used for various applications. Finally, the chaos synchronization for the proposed system is demonstrated by designing the nonlinear adaptive controllers. The efficiency of the synchronization methodology is verified theoretically by the Lyapunov stability theorem and numerical simulation in MATLAB environment.

Keywords: *chaotic system; no equilibrium points; amplitude control; offset boosting control; chaos synchronization*

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