ORIGINAL RESEARCH



Chaos Synchronization of a New Chaotic System Having Exponential Term Via Adaptive and Sliding Mode Control

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Abstract

In this paper, we have introduced a new three-dimensional system having exponential term. The chaotic nature of the system is analysed by examining the Lyapunov exponents, graphing the phase portraits, time series of state vectors, bifurcation diagram, and Poincare maps. The novel system has three equilibrium points and it is discussed that all equilibrium points are unstable in nature. The two schemes of adaptive control and sliding mode control for chaos synchronization have been discussed for the novel chaotic system. Suitable nonlinear controllers have been designed in both adaptive control and sliding mode control methods to achieve the desired synchronization between identical chaotic systems by using the Lyapunov stability theory and Vaidyanathan's theorem. Numerical simulations have been performed and the graphs are presented using MATLAB.

Keywords Chaos synchronization \cdot Chaotic system \cdot Adaptive control \cdot Sliding mode control \cdot Lyapunov stability

Mathematics Subject Classification 34A08 · 34D06 · 34H10 · 34H15

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