

# A new hyper-chaotic system and hyper-chaotic synchronization

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## Abstract

This paper presents a new hyper-chaotic system, which is obtained by adding a nonlinear controller to the third equation of the three-dimensional autonomous Chen-Lee chaotic system. Computer simulations demonstrated the hyper-chaotic dynamical behaviors of the system. Numerical results had found the new hyper-chaotic system possesses two positive exponents. It was also found that the structures of the hyper-chaotic attractors are more complicated than those of Chen-Lee chaotic system. Furthermore, the hybrid projective synchronization of the new hyper-chaotic systems was studied using a nonlinear feedback control. The nonlinear controller was designed according to the Lyapunov stability theory to guarantee hybrid projective synchronization, which includes synchronization, anti-synchronization, and projective synchronization. Numerical simulations were presented in order to illustrate the hybrid projective synchronization.

Keyword : Hyper-chaotic, Lyapunov, synchronization, hybrid projective synchronization