

# Synchronization and Anti-synchronization Coexist in the Chen-Lee Chaotic System

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## Abstract

This study demonstrates that synchronization and anti-synchronization can coexist in Chen-Lee chaotic systems by direct linear coupling. Based on Lyapunov's direct method, a linear controller was designed to assure that two different types of synchronization can simultaneously be achieved. Further, the hybrid projective synchronization of Chen-Lee chaotic systems was studied using a nonlinear control scheme. The nonlinear controller was designed according to the Lyapunov stability theory to guarantee the hybrid projective synchronization, including synchronization, anti-synchronization, and projective synchronization. Finally, numerical examples are presented in order to illustrate the proposed synchronization approach.

Keyword : Chen - Lee system,  
Lyapunov,  
chaotic,  
anti-synchronization,