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Function Projective Dual Synchronization of Chaotic Systems with Uncertain Parameters

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Abstract: This paper mainly concerns with the general methods for the function projective dual synchronization of a pair of chaotic systems with unknown parameters. The adaptive control law and the parameter update law are derived to make the states of a pair of chaotic systems asymptotically synchronized up to a desired scaling function by Lyapunov stability theory. The general approach for function projective dual synchronization of Lü system and Lorenz system is provided. Numerical simulation results show that the proposed method is effective and convenient.

Keywords: *function projective; dual synchronization; adaptive control; uncertain parameters; Lyapunov stability theory.*

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The essence of studying chaotic systems is to understand their structure and behavior. These systems are deemed important as they reflect and model natural phenomena. One of the main reasons for studying chaotic systems lies in the interest of controlling chaos. Many areas have branched from this study due to practical applications in many fields. The main property of chaotic dynamics is its critical sensitivity to initial conditions which is responsible for initially neighboring trajectories separating from each other exponentially in the course of time. For many years, this feature made chaos undesirable, insofar as the sensitivity to initial conditions of chaotic systems reduces their predictability over long time scales. On the other hand, the capability of chaotic dynamics to amplify small perturbations improves their utility for reaching specific desired states with very high flexibility and low energy cost. In contrast, the process of controlling chaos is directed to improving a desired behavior by making only small time-dependent perturbations in an

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