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A GENERAL METHOD FOR FUNCTION PROJECTIVE SYNCHRONIZATION

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Abstract. *This paper investigates function projective synchronization of a class chaotic systems. By Lyapunov stability theory, a general method for function projective synchronization is proposed to make the states of two chaotic systems asymptotically synchronized up to a desired scaling function. Furthermore, based on function projective synchronization, a scheme for secure communication is investigated in theory. The corresponding numerical simulations are performed to verify the effectiveness of the proposed scheme.*
Keywords: Function projective synchronization, Projective synchronization, Chaos synchronization, Lyapunov stability theory

1. **Introduction.** In nonlinear science, chaos synchronization has been very active topic owing to its wide-scope potential applications in physical systems, biological networks, secure communications, etc. Since the pioneering work of Pecora and Carroll, in which proposed a successful method to synchronize two identical chaotic systems with different initial conditions, various types of chaos synchrony have been revealed to investigate chaos synchronization, which include complete synchronization [1], phase synchronization [2], lag synchronization [3], generalized synchronization [4], time scale synchronization [5] and projective synchronization [6], etc. Amongst all kinds of chaos synchronization, projective synchronization has been extensively investigated [7-16] in recent years because it can obtain faster communication with its proportional feature [17-20]. Most of research efforts mentioned above have concentrated on studying the constant scaling factor, but it is seldom studying the function scaling factor. More recently a new type of synchronization called "function projective synchronization" was proposed in Ref. [21], where the master and slave systems could be synchronized up to a scaling function. Function projective synchronization is the more general definition of projective synchronization, where the scaling function $\alpha(t)$ is taken by a constant α. As compared with projective synchronization, function projective synchronization means that the master and slave systems could be synchronized up to a scaling function, but not a constant. The study of FPS is very important for practical applications because the unpredictability of the scaling function in FPS can additionally enhance the security of communications. This feature could be used to get more secure communications in application to secure communications.

In Ref. [21], the authors only gave the FPS of the coupled Lü systems by the backstepping method. Recently, we further investigate function projective synchronization based on adaptive control scheme in [22]. To the best of our knowledge, at present, there is