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Chaos Synchronization Approach Based on New Criterion of Stability

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Abstract: In this paper, we propose a simple method for chaos synchronization in continuous-time based on a new criterion for stability. This criterion implies the Lyapunov stabilization criterion, and is applicable to some typical chaotic systems. Numerical simulations in 3D and 4D are presented to demonstrate the effectiveness of the synchronization results derived in this paper.

Keywords: *chaos synchronization; new criterion; dynamical system; continuous-time; Lyapunov stability.*

Mathematics Subject Classification (2010): 37B25, 37B55, 37C75.

1 Introduction

During the last decade, chaos synchronization has become an active research area, due to its potential applications in information processing such as secure communication [1, 2]. Many types of synchronization have been presented [3–6] and various methods have been developed for synchronization of chaotic systems such as active and adaptive control method [7, 8], backstepping design technique [9], sliding mode control [10], generalized Hamiltonian systems approach [11, 12], and so on. Most of synchronization methods are based on Lyapunov stability theory to guarantee zero stability of errors dynamical system between master and slave chaotic systems.

In this paper, based on some lemma derived from Halanay inequality, we introduce a new and simple stability criterion to synchronize chaotic dynamical systems in continuous-time. In [13], authors derived an important result using Halanay inequality, we give it in the following lemma:

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