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LESS CONSERVATIVE CONDITIONS FOR ASYMPTOTIC STABILITY OF THE NUCLEAR SPIN GENERATOR VIA IMPULSIVE CONTROL

Yang Li[1] , K.W.Wong[2] and Zhong Zhang[3]

[1]Department of Computer Science and Engineering,
Chongqing University,Chongqing,P. R. China

[2]Department of Electronic Engineering
City University of Hong Kong, Hong Kong SAR, P. R. China

[3]Department of Mathematics and Physics,
Chongqing University,Chongqing,P.R. China

Abstract. In this Letter, an impulsive synchronization scheme for a chaotic nuclear spin generator is studied. Some novel and less conservative sufficient conditions on varying impulsive distance are established to guarantee the synchronization of the system. In particular, simple conditions are derived for synchronizing the system by equal impulsive distance. The boundaries of the stable regions are also estimated.Simulation results show that the proposed synchronization method is effective.

Keywords. Chaos, impulsive synchronization, nuclear spin generator.

1 Introduction

Over the last decade, synchronization of coupled chaotic systems has drawn a great deal of attention due to its potential applications in secure communication [16] since the pioneer work of Pecora and Carroll [7, 8]. Different regimes, namely, complete synchronization, phase synchronization, generalized synchronization, lag synchronization, and anticipative synchronization, have been investigated for various chaotic systems such as chaotic circuits, chaotic laser systems, pairs of neurons, chemical oscillators, etc. complete synchronization implies the coincidence of states of the interacting systems; generalized synchronization is defined as the presence of some functional relation between the states of driving and responding parts in a driveCresponse system; phase synchronization means the entrainment of phases of chaotic oscillators; lag synchronization appears as a coincidence of time-shifted states of two systems; and anticipative synchronization [9, 10] is that a dissipative chaotic system with a time-delayed feedback could drive an identical system in such a way that the driven system anticipates the driver by synchronizing with their future states. In fact, the presence of more than one positive Lyapunov exponent or unstable direction in these systems leads to