Dynamics of Continuous, Discrete and Impulsive Systems
Series **B:** *Applications & Algorithms* **15 (2008)** 155-164
 http://www.watam.org

ALGORITHM FOR CONTROL AND ANTICONTROL OF CHAOS IN CONTINUOUS-TIME DYNAMICAL SYSTEMS

Marius-F. Danca[1] and Miguel Romera[2]

[1]Department of Mathematics
Tehnofrig Technical College, 3400 Cluj-Napoca, Romania

[2]Instituto de Física Aplicada,
Consejo Superior de Investigaciones Científicas,
Serrano 144, 28006 Madrid, Spain

Abstract. In this paper we present a simple algorithm that allows the control and anticontrol of chaos. Considering two identical chaotic dynamical systems wich evolve for different control parameter values, the value of the first system state variables is modified to gain the corresponding value of the second system in order to bring near the two trajectories. Thus, the behavior of the first system is adapted to that of the second one. Three examples are considered.

Keywords. Chaotic dynamical system, anticontrol, chaos control, Lorenz system, Chen system, Rabinovich-Fabrikant system.

AMS subject classification: 34E99, 37M05, 65P20

1 Introduction

In the last years the stabilization of chaos like the slight perturbations of a system parameter (the most known being the OGY method [9]), or the changes in the system variables in the form of instantaneous pulses (GM algorithm, introduced by Güemez and Matías [6], [8]) have proved to be of a real interest. While the first class of algorithms are useful when we have access to the system parameters without changing the state variables, the second class of methods are useful in the cases when the system parameters are inaccessible, namely in the cases of certain chemical experiments, biological and ecological systems, electrical circuits etc.

The control algorithms using the parameter modification imply generally a supplementary knowledge of some data related to the system as Lyapunov exponents, covariant and contravariant vectors etc. On the other hand the algorithms which change the system variables are easier to implement, but less performing since it is difficult to find a clear link between the necessary variables pulses and certain targeted trajectory.

The anticontrol of chaos (or chaotification) which makes chaotic a non-chaotic dynamical system, or enhances the chaos in chaotic systems, have