Nonlinear Dynamics and Systems Theory, **8** (2) (2008) 169–194

Chaotic Dynamics in Hybrid Systems

P. Collins *

Centrum voor Wiskunde en Informatica, Postbus 94079
1090 GB Amsterdam, The Netherlands

Received: March 20, 2007; Revised: February 25, 2008

Abstract: In this paper we give an overview of some aspects of chaotic dynamics in hybrid systems, which comprise different types of behaviour. Hybrid systems may exhibit discontinuous dependence on initial conditions leading to new dynamical phenomena. We indicate how methods from topological dynamics and ergodic theory may be used to study hybrid systems, and review existing bifurcation theory for one-dimensional non-smooth maps, including the spontaneous formation of robust chaotic attractors. We present case studies of chaotic dynamics in a switched arrival system and in a system with periodic forcing.

Keywords: *Chaotic dynamics; hybrid systems; symbolic dynamics; nonsmooth bifurcations.*

Mathematics Subject Classification (2000): 34A37, 37B10, 37A40, 34A36, 37G35.