Delayed feedback control for the system with hyperbolic attractor

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For a long time it was a common opinion that hyperbolic attractors are artificial mathematical
The unique feature of this conference is to bring together all theoretical aspects of nonlinear
sciences of electrical engineering, physics and mathematics, as well as related applications.
Nonlinear oscillations, synchronization, chaotic behavior, neural networks and complex systems
together with power electronics, biomedical systems and neurocomputing are a few topical
examples for the need of expertise in the wide field of nonlinear sciences. Additionally, several
invited talks are given with respect to the 100th anniversary of the death of Henri Poincaré, who
was one of the founders of nonlinear sciences in the second half of the nineteenth century.
constructions
[1]. However, in the recent papers [2, 3] there were proposed physically realizable systems that
possess, in their phase space, the set with features that are very similar to hyperbolic type of
attractors.
As is known, invariant sets are called hyperbolic attractors of the dynamical system if they are
closed,
topologically transitive subsets, and every their trajectory possesses uniform hyperbolicity. Very
familiar
types of the hyperbolic attractors are Smale-Williams' solenoid and Plykin's attractor.
Further, it is well known that chaotic systems are very sensitive to the external perturbations. This
property is used for controlling nonlinear systems and chaos suppression. Thus, an important
question
arises: Is it possible to suppress chaos in systems with hyperbolic attractors because these
attractors
are structurally stable subsets?
In the present contribution we study the possibility of stabilization of chaotic oscillations in
systems with
the Smale-Williams hyperbolic attractors by means of the Pyragas method with a delay [4]. It is
shown
that by means of external perturbation the dynamical system could be controllable: the
hyperbolic attractor
degenerates into a periodic one.

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