Global stabilization of some chaotic dynamical systems

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Abstract
In this paper, based on the theory of nonlinear differential equations and Gerschgorin theorem, a control scheme is proposed for global stabilizing the unstable equilibria of a class of chaotic systems. Using a suitable designing to the feedback gain matrix which depends on a few algebraic inequalities, chaotic orbits are suppressed and dragged to the target (system's equilibria). The proposed scheme is successfully applied to some typical chaotic systems with different types of nonlinearities, such as Rossler system, Nuclear Spin Generator system, and Four-scroll attractor. Numerical simulation results are presented to verify our control method. (C) 2009 Elsevier Ltd. All rights reserved.

KeyWords: NUCLEAR-SPIN GENERATOR; SYNCHRONIZATION RITERION; 4-SCROLL ATTRACTOR; ADAPTIVE-CONTROL; ROSSLER SYSTEM; FEEDBACK; PARAMETERS
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Analysis of nonlinear triopoly game with heterogeneous players

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Abstract
A nonlinear triopoly game with heterogeneous players is presented. We consider three types of players: boundedly rational, adaptive, and naive. A triopoly game is modelled by a three dimensional discrete dynamical system. The stability conditions of the equilibrium points are analyzed. Numerical simulations are used to show bifurcation diagrams, phase portraits, sensitive dependence on initial conditions and fractal dimension. The chaotic behavior of the model has been stabilized on the Nash equilibrium point, by the use of the Pyragas delay feedback control method.
KeyWords: Triopoly game; Heterogeneous players; Fractal dimension; DFC method
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Chaotic dynamics of a discrete prey-predator model with Holling type II

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Abstract
A discrete-time prey-predator model with Holling type II is investigated. For this model, the existence and stability of three fixed points are analyzed. The bifurcation diagrams, phase portraits and Lyapunov exponents are obtained for different parameters of the model. The fractal dimension of a strange attractor of the model was also calculated. Numerical simulations show that the discrete model exhibits rich dynamics compared with the continuous model, which means that the present model is a chaotic, and complex one. (c) 2008 Published by Elsevier Ltd.

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Bifurcations, chaos and synchronization in ADVP circuit with parallel resistor

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Abstract
In this work we investigate the dynamical behaviors of Van der Pol-Duffing circuit (ADVP) with parallel resistor. The model is described by a continuous-time three dimensional autonomous system. The stability conditions of the equilibria are analyzed. The existence of periodic solutions and their stabilities about the node equilibrium point of the system are studied by using Hopf's theorem and Hsu and Kazarinoff theorem. Lyapunov spectrum is calculated for the proposed system. Adaptive synchronization using backstepping design is applied successfully to the system. Chaotic behaviors and the efficiency of the synchronization method are verified by numerical simulations. (c) 2007 Elsevier Inc. All rights reserved.
KeyWords: Van der Pol-Duffing circuit; stability; bifurcations; super (sub)-critical bifurcations; chaos; Lyapunov exponents; fractal dimension; synchronization; backstepping design approach
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Adaptive synchronization of a hyperchaotic system with uncertain parameter

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Abstract
This paper addresses the synchronization problem of two Lu hyperchaotic dynamical systems in the presence of unknown system parameters Based on Lyapunov stability theory an adaptive control law is derived to make the states of two identical Lu hyperchaotic systems with unknown system parameters asymptotically synchronized. Numerical simulations are presented to show the effectiveness of the proposed chaos synchronization schemes. (c) 2005 Elsevier Ltd. All rights reserved.

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