Book Review

Recent Progress in Controlling Chaos

Book Authors: **Miguel A. F. Sanjuan and Celso Grebogi.**
World Scientific Publishing Co. Pte. Ltd.
Series on Stability, Vibration and Control of Systems, Series B, Vol. 16.
2010, 431 pp., ISBN-13 978-981-4291-69-9; ISBN-10 981-4291-69-2

Reviewer: Prof. Minvydas Ragulskis
Kaunas University of Technology
E-mail: *minvydas.ragulskis@ktu.lt*
www.personalas.ktu.lt/~mragul

(Received 03 December 2009; accepted 03 March 2010)

Recent Progress in Controlling Chaos is a carefully selected collection of 15 papers presenting most important developments in a focal research area of chaos control. World-renowned authors in the field of nonlinear dynamics and chaos provide an insight into many challenging problems. Fundamental problems of adaptive and delayed feedback control techniques, phase and partial chaos control methods are intertwined with more applied topics such as the reduction of chaotic transport in turbulent magnetized plasmas, control of chaotic bursting neural networks, traffic flows and celestial processes, information encoding and processing.

The first Chapter deals with the reduction of the chaotic transport of impurities in turbulent magnetized plasmas. The concept of the control term for a potential which varies rapidly in time is introduced, its efficiency and robustness is analyzed. Chaos control in a chaotic neural network is discussed in Chapter 2. Pinning methods, phase space constraint control, threshold coupling method and parameter modulated method, delay feedback control methods are presented and illustrated for controlled dynamics and associative memory dynamics applications of chaotic neural networks. Chapter 3 presents adaptive feedback control techniques of periodic orbits in chaotic systems; Chapter 4 introduces the concept of the feedback anti-control of chaos. Delayed feedback control techniques are thoroughly discussed in Chapter 5 with a variety of examples, applications and generalizations. The concept of phase control in nonlinear systems is introduced in Chapter 6. Phase control of intermittency and phase control of escapes in open systems are illustrated by numerical and experimental simulations. Recent advances in control of complex dynamics in mechanical and structural systems are discussed in Chapter 7. A powerful control strategy based on the threshold mechanism when the chaotic orbit is clipped to periodic time sequences of desired length is reviewed in Chapter 8. The complex behavior of city traffic and control of its patterns is discussed in Chapter 9. An external harmonic signal and a time-delayed feedback signal are used as control strategies for chaotic bursting control in map-based neuron network models in Chapter 10. The concept of partial control of chaotic systems is presented in Chapter 11. Strategies of continuous and pulsive feedback control of chaotic systems are discussed in Chapter 12; the technique based on the stabilization of unstable periodic points is reviewed in Chapter 13. Finally, chaos stabilization in the three body problem and controlling chaos in a gyrostat satellite using fuzzy estimations are discussed in Chapters 14 and 15.

This book offers a broad view of the progress in the field during the recent years. It will be very useful for anyone working in the general field of nonlinear dynamics, chaos and complex systems. A fascinating insight into the state-of-the-art technology of chaos control, key concepts and techniques provides the attractiveness of the study and brings new results and ideas both to students and advanced researchers.