2013 CHAOS

BOOK OF ABSTRACTS

6th Chaotic Modeling and Simulation International Conference

Editor
Christos H. Skiadas

11 – 14 June 2013

Yeditepe University
Istanbul Turkey

Observation of Chaotic Behaviour in Physical Ageing of Chalcogenide Glasses

Oleh I. Shpotyuk[1], Avadis S. Hacınlıyan[2], Roman Golovchak[3], Yani Skarlatos[2], Valentina Balitska[5], Ilnkur Kusbeyzi Aybar[2], Andrzej Kozdras (7), Orhan Ozgur Aybar[2]

[1]Scientific Research Company "Carat", Ukraine, [2]Yeditepe University, Turkey, [3]Lehigh University, USA, [4]Lviv State University of Vital Activity Safety, Ukraine, [5]Opole Technical University, Poland

Theory of strange attractors is shown to be adequately applied to analyze the kinetics of structural relaxation in arsenoselenide glasses below glass transition (physical ageing). Kinetics of enthalpy losses induced by prolonged dark storage in natural conditions (natural physical ageing) or exposure with light of different discrete wavelengths near fundamental absorption edge region (light-assisted physical ageing) are used to determine phase space reconstruction parameters. Observed chaotic behaviour (involving chaos and fractal analysis such as detrended fluctuation analysis, attractor identification using phase space representation, delay coordinates, mutual information, false nearest neighbours) reconstructed via TISEAN program is treated within potential energy landscape as diversity of transitions between different basins-metabasins towards more thermodynamically equilibrium state, minimizing free energy of the system.

Keywords: Chaotic behaviour, Physical ageing, Chalcogenide glass, Relaxation kinetics, Chaotic simulation.

New Scenarios Of Transition To Deterministic Chaos In Dynamic Systems With A Limited Power-Supply

A. Yu. Shvets

NTUU "Kiev Polytechnic Institute", Ukraine

Despite the infinite variety of the dynamic systems, it is possible to divide all scenarios of transitions to deterministic chaos into three basic groups. To the first group belongs Feigenbaum scenario of transition to chaos through an infinite cascade of period-doubling bifurcations of limit cycles. To the second group of scenarios belong transitions to chaos through an intermittency by Pomeau-Manneville of various types. At last, to the third group of scenarios belong transitions to chaos through destruction of quasiperiodic attractors (invariant toruses).

For dynamic systems with limited power-supply (non-ideal systems in sense of Sommerfeld-Kononenko) was described the new scenarios of transitions "regular regime - chaos" and "chaos - chaos", which are the generalisation of some scenarios of the first and second groups. In