ΕΙΔΙΚΑ ΘΕΜΑΤΑ ΜΗ ΓΡΑΜΜΙΚΗΣ ΔΥΝΑΜΙΚΗΣ

ΤΖΑΜΑΛ-
ΟΔΥΣΣΕΑΣ
ΜΑΑΪΤΑ

ΕΥΘΥΜΙΑ
ΜΕΛΕΤΛΙΔΟΥ

Abstract

The book includes special topics of nonlinear dynamical systems in continuous and discrete time and applications. Its aim is to enrich the Greek literature in dynamical systems with more specialized topics. The book is divided into five sections. The first section includes a detailed introduction to the theory of dynamical systems that allows even a non-specialist reader to proceed with the study and understand the topics covered in the book. The second section deals with regular and chaotic attractors, both those associated with equilibrium points and those not associated with any unstable equilibrium point and called hidden. It also includes the essential tools for detecting chaotic behaviour, such as the Melnikov theory and various numerical indices, such as Lyapunov exponents, the SALI method and the GALI method. The third section deals with Hamiltonian systems, integrable and non-integrable. Various theorems, such as the KAM Theorem and the Poincare Birkhoff theorem, and different non-integrability criteria and theorems are also presented. The fourth section includes discrete systems (maps) in one or more dimensions, as well as symbolic dynamics. In this section, the basic concepts are developed, various theorems with which the discrete systems are studied, and the idea of fractal sets and the characteristic Julia and Mandelbrot set. The last fifth section includes chapters with applications such as Targeted Energy Transfer in coupled linear and nonlinear oscillator systems, epidemiology and Josephson Junctions.