

Chaotic Electronic System with Lambda Diode

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Abstract : The Chua diode has been configured over time in various ways, using electronic structures like as operational amplifiers (OAs) or devices with gas or semiconductors. When discussing the use of semiconductor devices, tunnel diodes (Esaki diodes) are most often considered, and more recently, transistorized configurations such as lambda diodes. The paper-work proposed here uses in the modeling a lambda diode type configuration consisting of two Junction Field Effect Transistors (JFET). The original scheme is created in the MULTISIM electronic simulation environment and is analyzed in order to identify the conditions for the appearance of evolutionary unpredictability specific to nonlinear dynamic systems with chaos-induced behavior. The chaotic deterministic oscillator is one autonomous type, a fact that places it in the class of Chua's type oscillators, the only significant and most important difference being the presence of a nonlinear device like the one mentioned structure above. The chaotic behavior is identified both by means of strange attractor-type trajectories and visible during the simulation and by highlighting the hypersensitivity of the system to small variations of one of the input parameters. The results obtained through simulation and the conclusions drawn are useful in the further research of ways to implement such constructive electronic solutions in theoretical and practical applications related to modern small signal amplification structures, to systems for encoding and decoding messages through various modern ways of communication, as well as new structures that can be imagined both in modern neural networks and in those for the physical implementation of some requirements imposed by current research with the aim of obtaining practically usable solutions in quantum computing and quantum computers.

Keywords : chaos, lambda diode, strange attractor, nonlinear system

Conference Title : ICCTDS 2023 : International Conference on Chaos Theory and Dynamical Systems

Conference Location : Amsterdam, Netherlands

Conference Dates : September 11-12, 2023