

1014-34-1574

Georgi S. Medvedev* (medvedev@drexel.edu), Department of Mathematics, Drexel University, 3141 Chestnut Street, Philadelphia, PA 19104. *Using one-dimensional maps for analyzing neuronal dynamics.*

After a classical series of papers by Hodgkin and Huxley nonlinear differential equations became a common framework for modeling neurons. The bifurcation theory for nonlinear ordinary differential equations provides a powerful suite of tools for analyzing neuronal models. Many such models reside near multiple bifurcations. Consequently, in using bifurcation analysis one often encounters rich and complicated bifurcation structure. Therefore, it is desirable to distinguish the universal features pertinent to a given dynamical behavior from the artifacts peculiar to a particular model. The goal of this talk is to describe some general traits of the bifurcation structure for a class of models of excitable cells. They follow from the generic properties of two-dimensional flows near a homoclinic bifurcation. We present a method of reduction of a model of an excitable cell to a one-dimensional map. The bifurcation structure of the system with continuous time endows the map with distinct features: it is a unimodal map with a boundary layer corresponding to the homoclinic bifurcation in the original model. The qualitative features of this map account for various periodic and aperiodic regimes and transitions between them. (Received September 28, 2005)