1014-37-334 **Irina Popovici*** (popovici@usna.edu), Mathematics Department, US Naval Academy, Annapolis, MD 21402, and **B. M. Baker** and **M. Kidwell**. *A Two Dimensional Dynamical System Underlying Cardiac Arrhythmias.*

In this paper we study the Dynamical Systems that were introduced by Baker and Kline to investigate the connection between membrane currents, action potential duration, and cardiac rhythm. The family of two-dimensional maps in which the kinetic parameters are modeled follow three basic assumptions: 1) increase of the parameters until a threshold for re-polarization is reached, 2) exponential decay of these parameters immediately after threshold is reached, 3) a periodic constraint. Our focus here is a rigorous analysis of this continuous, but not C^1 system in the plane (its dynamics is significantly richer than its previously studied one dimensional counterpart). Our principal results give the existence and stability properties of orbits analogous to the so called escalator orbits of the one-dimensional family, the co-existence of stable orbits for fixed values of the period parameter, existence of bunny-ears orbits. We consider the latter results our most important, owing to conjectures that such period parameter values could produce arrhythmic behavior in a potentially spatially disorganized fashion. (Received September 09, 2005)