Thesis Title Dynamical Behavior Analysis of a Model for Bursting Electrical Activity in the Pancreatic β-cell

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ABSTRACT

We consider a model for the phenomenon of bursting electrical activity in the pancreatic β - cell. Consisting of three coupled first - order nonlinear differential equations, the model describes the dynamics of the membrane potential, the activation parameter for the voltage - gated potassium channel, and the intracellular calcium concentration. The bursting electrical activity depends on fast and slow processes with distinctly different time scale which, when taken to the limit of highly diversified dynamics, allows for the application of the singular perturbation method. Computer simulations are then presented in support of our theoretical predictions.