

Neuron Dynamics of Single-Compartment Traub Model for Hardware Implementations

Authors : J. C. Moctezuma, V. Breña-Medina, Jose Luis Nunez-Yanez and Joseph P. McGeehan

Abstract : In this work we make a bifurcation analysis for a single compartment representation of Traub model, one of the most important conductance-based models. The analysis focus in two principal parameters: current and leakage conductance. Study of stable and unstable solutions are explored; also Hop-bifurcation and frequency interpretation when current varies is examined. This study allows having control of neuron dynamics and neuron response when these parameters change. Analysis like this is particularly important for several applications such as: tuning parameters in learning process, neuron excitability tests, measure bursting properties of the neuron, etc. Finally, a hardware implementation results were developed to corroborate these results.

Keywords : Traub model, Pinsky-Rinzel model, Hopf bifurcation, single-compartment models, bifurcation analysis, neuron modeling

Conference Title : ICNCN 2014 : International Conference on Neuroinformatics and Computational Neuroscience

Conference Location : London, United Kingdom

Conference Dates : June 29-30, 2014