



An Investigation of the Coefficient of Variation Using the Dissipative Stochastic Mechanics Based Neuron Model

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Abstract— In recent years, it has been argued and shown experimentally that ion channel noise in neurons can have profound effects on the neuron's dynamical behaviour. Most profoundly, ion channel noise was seen to be able to cause spontaneous firing and stochastic resonance.

A physical approach for the description of neuronal dynamics under the influence of ion channel noise was proposed recently through the use of dissipative stochastic mechanics by Guler in a series of papers. He consequently introduced a computational neuron model incorporating channel noise. The most distinctive feature of the model is the presence of so-called the renormalization terms therein. This model exhibits experimentally compatible noise induced transitions among its dynamical states, and gives the rose-Hindmarsh model of the neuron in the deterministic limit.

In this paper, statistics of coefficient of variation will be investigated using the dissipative stochastic mechanics based neuron model.

Keywords— Ion Channel Noise; Stochastic Ion Channels; Neuronal Dynamic; Hindmarsh-Rose Model; Dissipative Stochastic Mechanism Model

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