1067-92-490   **Frederic Y. M. Wan*** (`fwan@uci.edu`), Department of Mathematics, University of California, Irvine, Irvine, CA 92697-3875. *Linear PDE Models of Neurons with Random Excitations*.*

Neuronal models, including Rall's equivalent cylinder for cable neurons and its variants, are often in terms of linear PDE. For neuron subject to random excitations, the solution may be in the form of a Green's function representation. Statistical properties (mean, correlations, higher order moments) can be determined from the corresponding measures of the input by the expectation of combinations of the Green's function representation. In practice, Green's functions are often not available analytically. To compute the needed Green's function numerically and then evaluate the multiple integrals involved in the desired statistics require excessive computing. Equally serious is the huge storage requirement for a function of four or more variables that may be impractical for the needed accuracy. While Monte Carlo simulations are possible, determining statistical properties of interest by solving directly some deterministic problems in PDE (for which there is a large body of knowledge on their numerical solutions) is desirable. This paper 1) develops such a method; 2) applies it to several problems in biology, and 3) shows how the method takes advantage of recent efficient algorithms that reduce storage requirements by orders of magnitude. (Received September 06, 2010)

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