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FINITE VOLUME MODEL TO STUDY CALCIUM DIFFUSION IN NEURON CELL UNDER EXCESS BUFFER APPROXIMATION

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Abstract

Calcium is the vital second messenger for intracellular signaling in neuron cell, which plays an important role in communication process almost every organ in human body. In presence of an excess of exogenous buffer, the reaction-diffusion system describing the calcium-buffer dynamics has been understand the extent of the micro domain formation and in quantifying the apparent diffusion of the free calcium. The region in neuron cells where the flow of electric current cannot take place is the main region of activity for chemical signaling. The chemical signaling process is achieved by the diffusion of calcium. In this paper, an attempt has been made to study calcium signaling in neuron cells for one dimensional steady state in spherical case. This model assumed EBA (Excess Buffering Approximation), incorporating all the important parameters like rate of diffusion, buffers and calcium influx in the mathematical model. Appropriate boundary conditions have been framed. The finite volume method has been employed to obtain the solution of the calcium concentration profile.

Key Words : *Reaction diffusion equation, EBA, Calcium influx, Finite Volume, Rate constants, Diffusion constant, Matlab.*