
MAURICIO LABADIE, University of Paris VI
A reaction-diffusion model for calcium in neurons

The concentration of calcium ions inside dendritic spines (microstructures of the neuron) plays a crucial role in the synaptic plasticity, and in consequence in cognitive processes like learning and memory. We construct a reaction-diffusion system that models the dynamics of calcium ions in the spine, taking into account the chemical interactions between the calcium ions and three different types of proteins. We prove that this system is a well-posed problem, i.e., we have a priori estimates, global existence, global uniqueness, positivity of solutions and continuity with respect of the initial data.

This result will appear in the article of Kamel Hamdache and Mauricio Labadie, *On a reaction-diffusion model for calcium dynamics in dendritic spines*, *Nonlinear Analysis: Real World Applications* **10**(2009), 2478–2492 (August issue). This article has been published online on May 2008 (doi: 10.1016/j.nonrwa.2008.05.005).