Some Equations from Neuroscience

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Abstract

The study of mathematical models of neurons is a relatively recent field, the first step of which consisted of modeling the evolution of the membrane potential of a single neuron. The development of these models spanned the entire 20th century, marked by major contributions such as the Integrate-and-Fire, Hodgkin-Huxley, and FitzHugh-Nagumo models.

In this talk, I will begin by briefly outlining the history of the various existing models, then I will present two PDE models applied to neuroscience : an age-structured equation and the Noisy Integrate-and-Fire model. Based on these models, I will also present mathematical tools useful for studying the asymptotic behavior of these equations, such as Doeblin's method and entropy dissipation techniques.