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Parameter Identifiability in the Hodgkin-Huxley Model of a Single Neuron TYLER BAHR, MARK TRANSTRUM, Brigham Young University — Neurons convey information through the propagation of an action potential across the cell membrane. The foundational model of potential propagation, formulated by Hodgkin and Huxley in 1952, involves 4 dynamical variables and 26 parameters. In contrast, most foundational theories in physics usually depend on a small number of parameters, for example, the BCS model of superconductivity has one free parameter. We consider the question: Are all of the parameters in the Hodgkin Huxley model necessary? Unnecessary parameters will be unconstrained by the model behavior. We therefore perform a parameter identifiability analysis for the spiking behavior of a Hodgkin Huxley neuron. We show that many of the parameters in the Hodgkin-Huxley model are likely unnecessary. We discuss preliminary results attempting to remove the unnecessary parameters from the model.

Mark Transtrum
Brigham Young University

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