Parameter Reduction of the Hodgkin-Huxley model of Action Potential Propagation[1] TYLER BAHR, Brigham Young University — In 1952 Hodgkin and Huxley formulated the fundamental biophysical model of how neurons integrate voltage input and fire electric spikes. Like most biological models, it is very complex, both in terms of its dynamics and number of parameters. A Hodgkin-Huxley model of a single neuron with two ion channels has 25 parameters. Using information theory and model reduction methods, we explore the extent to which all of these parameters are necessary. The manifold boundary approximation method (MBAM), is a powerful approach to parameter reduction based on a geometric interpretation of statistics. Using MBAM, we have derived a simpler model of spike firing (14 parameters). We present preliminary data in evaluating the behavior of the reduced model compared to original for different experimental conditions, including a network from the literature.

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