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**Rebecca Gasper\*** ([rebecca-gasper@uiowa.edu](mailto:rebecca-gasper@uiowa.edu)), The University of Iowa, Department of Mathematics, 14 MacLean Hall, Iowa City, IA 52242. *Action Potentials in Peripheral Auditory Nervous System: A Novel PDE Distribution Model*. Preliminary report.

Long have speech and hearing pathologists analyzed clinical reaction speeds by constructing histograms (graphs with reaction times sorted into time interval ‘boxes’). Their goal is to experimentally model reaction time of a neuron as a function of stimulus strength; understanding signal propagation has applications in Cochlear Implant design and maintenance. Since a popular model for single-node action potential magnitude is known (Hodgkin and Huxley, 1952), we can use numerical methods to create an entire probability distribution of firing times. Mathematically, we transition from a deterministic nonlinear ODE to an advection-diffusion PDE which represents distribution of all the states of ODE variables over time. Using steady-state assumptions or more complicated assumptions such as stochasticity, we show preliminary results to the question “When will a neuron fire and how does the distribution of firing times depend on parameters?” (Received August 30, 2012)