1135-92-2199 Kaia Lindberg* (klindberg923@g.rwu.edu) and Edward Dougherty. *Computational Simulation of a Partial Di erential Equation Based Model of Electrostatic Forces on Neuronal Electrodynamics.* Preliminary report.

Neurostimulation therapies demonstrate success as a medical intervention for individuals with neurodegenerative diseases. Despite promising results from these treatments, the in uence of an electric current on ion concentrations and subsequent transmembrane voltage is unclear. This project focuses on developing a unique cellular-level mathematical model of neurostimulation to better understand its e ects on neuronal electrodynamics. The Poisson-Nernst Planck system of PDEs is used to model electric potential, transmembrane voltage, and ion concentrations. This system is decoupled using the Gauss Siedal method and then the equations are solved using the nite element method on a biologically-inspired discretized domain. Using FEniCS we have conducted numerous numerical experiments on several two-dimensional neuronal geometries involving action potential generation and external current application. Preliminary results demonstrate the in uence of applied external currents on membrane voltage. Future work will include extending these computational simulations to three-dimensional neuron domains and integrating an ODE based intracellular signaling pathway model. Hopefully this work will ultimately help elucidate the principles by which neurostimulation alleviates disease symptoms. (Received September 25, 2017)