1065-34-154 **Andrei V. Olifer*** (aolifer@emory.edu), Emory University, 1510 Clifton Rd. NE, Room 2172, Atlanta, GA 30322, and **Astrid A. Prinz**. *Geometry and Dynamics of Activity-Dependent Homeostatic Regulation in Neurons.*

Activity-dependent homeostatic regulation (ADHR) maintains robust neuronal functioning in the face of intra- and extracellular perturbations and, in particular, constant turnover of the proteins that determine neuronal excitability. Such regulation is critical for normal processing of the nervous system, avoiding pathological states such as seizures, and recovering from injuries, for example caused by stroke. The physiological mechanisms of ADHR are complex. They involve multiple biochemical pathways and act at several spatial and temporal scales. Known mathematical models of ADHR mimic experimental data but limitations and mathematical properties of these models are poorly understood. To understand ADHR better, we set and solve a prototypical homeostatic regulation problem for a classical Morris-Lecar neuronal model. We solve the problem by separating fast neuronal and slow regulatory dynamics of the system. The success or failure of regulation is determined by considering the bifurcation diagram of the averaged fast system and the manifolds of the regulated parameters. The obtained results are discussed from the control theory perspective. Our work clarifies existing models and formulates specific questions for future experimental and theoretical studies of ADHR. (Received September 12, 2010)