1077-35-1808 **Sergei Avdonin*** (s.avdonin@alaska.edu), Department of Mathematics, UAF, Fairbanks, AK 99775-6660, and **Jonathan Bell** (jbell@umbc.edu), Dept. of Mathematics, UMBC, Baltimore, MD 21250. *Determining Physical Parameters for a Neuronal Cable Model Defined on a Tree Graph.*

Dendrites of nerve cells have membranes with spatially distributed densities of ionic channels and hence non-uniform conductances. A neuron's dendritic tree is described by a parabolic type equation with spatially distributed conductance in its coefficients defined on each edge of a tree graph domain. We suppose that the Kirchhoff-Neumann conditions are satisfied at all internal nodes expressed a current conservation condition. Our goal is to recover the unknown conductance on the graph and its topology from boundary observations of the current and voltage.

Only recently has investigations of inverse problems on graphs been under investigation, and this largely has not involved the peculiarities imposed by biological constraints. Also, there is almost no numerical implementation of theoretical results on inverse problems on graphs in the literature. Our research is concerned with both theory and algorithm development.

Our approach is based on the boundary control method. We prove the uniqueness theorem and propose a constructive procedure for recovering the parameters of the tree. Our procedure is recursive; it allows recalculating efficiently the inverse data from the original tree to smaller trees, 'pruning' leaves step by step down to the rooted edge. (Received September 21, 2011)