1154-00-2785 **Abigail T Small***, 34 Twin Brook Ln., Taunton, MA 02780, Taunton, MA 02780, and **Edward T Dougherty**. *Multi-scale Modeling of Neurostimulation with Application to Post-traumatic Stress Disorder.*

Post-traumatic stress disorder (PTSD) is a neurological condition which results from a traumatic experience caused by physiological shock or physical harm. Clinical results show success in combating the symptoms of PTSD with a neurostimulation treatment called transcranial direct current stimulation (tDCS). Though effective, the underlying mechanisms of the treatment and its success are not fully comprehended. To help elucidate reasons for its effectiveness, a partial differential equation based mathematical model of tDCS for PTSD has been implemented. Using the finite element method, numerical simulations generate results that predict and quantify the electrical energy distribution during tDCS sessions. Simulations utilize real-world electrode montages and treatment parameters for PTSD and a three-dimensional, MRI-derived cranial cavity with biologically-based tissue conductivities. Regions of the brain thought to be targeted by tDCS treatments are confirmed with in silico experiments, thus validating the model and approaches. Finally, a novel, partial differential equation based multiscale mathematical model of tDCS is presented, which uniquely adds the ability to quantify neural tissue response via tDCS-induced transmembrane voltage polarization. (Received September 17, 2019)