1145-VF-1465 **Edward T Dougherty*** (edougherty@rwu.edu), One Old Ferry Road, Bristol, RI 02809, and **James C Turner** and **Frank Vogel**. *Efficient Iterative Methods for Finite Element Based Neurostimulation Simulations.* Preliminary report.

Mathematical simulations of transcranial direct current stimulation (tDCS) allow researchers and clinical practitioners to investigate this form of neurostimulation computationally. For these simulations to be of practical use to the medical community, patient-specific head geometries and finely discretized computational grids must be used, and as a result, solving the partial differential equations that govern tDCS can be computationally burdensome. To address this issue, we compare the convergence performance of diverse numerical approaches when solving the linear system generated from a finite element discretization of the tDCS governing equations. Simulations consist of common tDCS electrode configurations on MRI-derived head models with physiologically-based tissue conductivities. Convergence metrics of each linear solver are examined, and compared and linked to theoretical estimates. It is shown that Krylov subspace based methods achieve superior convergence rates only when preconditioned with an appropriately configured multigrid algorithm. In addition, we show that characteristics of tDCS simulations make multigrid as a stand-alone solver highly ineffective. These findings help to extend tDCS simulation support to high resolution and high-volume computing applications. (Received September 22, 2018)