1154-VC-2783 **Edward Dougherty***, Roger Williams University, One Old Ferry Road, Bristol, RI 02809, and **James Turner** and **Frank Vogel**. *Iterative Methods and Preconditioners for Finite Element Method Based Simulations of Transcranial Direct Current Stimulationn.*

Mathematical modeling and numerical simulation of neurostimulation treatments has provided a bridge between practicing clinicians and in silico experimentation, enabling this field to investigate transcranial direct current stimulation (tDCS) with patient-specific, computer-based solutions. A drawback of this approach is the burden in solving the partial differential equations that model tDCS, given the need by the medical community to utilize patient-specific head geometries and finely discretized computational grids. To address this issue, we compare the performance of distinct numerical approaches when solving the linear system of equations produced from tDCS based finite element discretizations. Computer experiments incorporate medically-based tDCS electrode configurations on actual MRI-generated head geometries with biological brain tissue conductivity values. In addition, convergence performances of each solution approach are lined to theoretical estimates. Results show that a properly configured geometric multigrid preconditioner for Krylov subspace based linear solvers achieve superior convergence rates when compared to alternative approaches. In addition, we demonstrate that real-world aspects of tDCS yield multigrid as a stand-alone solver highly inappropriate. (Received September 17, 2019)