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**MHD Simulations with Self Consistent Boundary Conditions** G.J. MARKLIN, T.R. JARBOE, Plasma Science and Innovation Center, University of Washington, Seattle, Washington 98195 — Modern ICC experiments, such as those using inductive helicity injection and rotating field current drive, use insulation to allow flux from multiple circuits to enter and form complex patterns of rotating E&M fields over the surface. The HIT-SI geometry is used to develop a new method of handling such boundary conditions for 3D simulations. The insulating layer between the plasma and the conducting wall allows magnetic flux to move along the surface at the speed of light, assumed to be infinite, until it finds equilibrium with the plasma and circuit conditions it encounters on each time step. This 2D surface equilibrium determines the locally self consistent magnetic boundary condition. Plasma inflow is used to model gas injectors and the momentum boundary condition couples to the surface magnetic field leading to a nonlinear Poisson equation. This poster will derive these surface equilibrium equations and show how they are solved on a tetrahedral mesh. Simulations of a spheromak tilting mode in a cylinder, a toroidal RFP, and HIT-SI will show the difference between the insulated conductor and the conventional bare conductor boundary condition. The HIT-SI results will be compared with experimental data to determine whether the physics of the resistive MHD model is adequate to describe observed reconnection rates.

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