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Free-Boundary 3D Equilibria and Resistive Wall Instabilities with M3D-C1[1] N.M. FERRARO, L.L. LAO, General Atomics, S.C. JARDIN, Princeton Plasma Physics Laboratory, J.D. KING, Oak Ridge Associated Universities, M.W. SHAFER, Oak Ridge National Laboratory, F. ZHANG, RPI — A resistive wall model has been implemented in the two-fluid, 3D MHD code M3D-C1. This capability allows M3D-C1 to be applied to several new applications that were not possible with conducting wall boundary conditions, including vertical displacement events, resistive wall modes, and free-boundary equilibria. Examples of each for both DIII-D and NSTX are presented. This also permits direct comparison of M3D-C1 results with magnetic probe data. Generally good agreement with magnetics data and qualitative agreement with soft x ray imaging is found in simulations of the non-axisymmetric response to applied 3D fields. It is found that the response can be sensitive to the treatment of the open field-line region. The boundary conditions and treatment of the open field-line region are especially important for the n=1 response. In M3D-C1, the resistive wall and the external vacuum region are included within the computational domain, which allows good implicit scaling, walls of arbitrary thickness, and the evolution of wall conditions.

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Nate Ferraro
General Atomics

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