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The effects of applied 3-D magnetic fields and resistive wall boundary conditions on nonlinear MHD simulations¹ A.L. MONT-GOMERY, C.C. HEGNA, C.R. SOVINEC, A.J. COLE, University of Wisconsin, Madison, S.E. KRUGER, Tech-X Corp. — Two applications of a resistive wall boundary condition are implemented in NIMROD: the periodic cylinder with external resonant magnetic fields, and a toroidal resistive wall condition. The resonant 3-D magnetic fields are used to study the shielding of error-fields by axial flow and error-field penetration leading to locked magnetic islands. These studies employ stable, zero- β equilibria, and the effects of the degree of stability (measured by the parameter Δ) are investigated. A toroidal resistive wall boundary condition is also developed for NIMROD by matching the magnetic fields inside the domain with the external fields found using a vacuum-field solver. The toroidal boundary condition is tested in the large aspect ratio, circular cross-section limit, and compared to the results from the periodic cylinder boundary condition.

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