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Numerical Studies of Linear Two Fluid Tearing Modes in Slab and Cylindrical Geometries[1] J.R. KING, C.R. SOVINEC, V.V. MIRNOV, University of Wisconsin — The NIMROD code is applied to two-fluid tearing computations in slab and cylindrical geometry. Linear computations in slab geometry with large guide field and force-free equilibria scan plasma beta and the tearing stability parameter for benchmarking with analytical theory. A revised meshing algorithm improves numerical resolution, and convergence studies for all parameter regimes are presented. Growth rates approach the MHD values at beta values much less than 1%. Nonlinear results for these force-free cases show broadening of a Hall dynamo effect to the island width scale upon saturation. The effect of adding guide field to the non-force-free GEM problem is also investigated; fast two-fluid reconnection becomes suppressed. Finally, cylindrical force-free linear calculations with parameters relevant to the Madison Symmetric Torus Reversed Field Pinch are compared to existing analytics. The broadening of the flow-velocity profile is understood qualitatively from the analytical foundation. Requirements for nonlinear 3D two-fluid cylindrical computations are also considered.

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