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Numerical Studies of Two-Fluid Tearing and Dynamo in a Cylindrical Pinch[1] JACOB KING, CARL SOVINEC, VLADIMIR MIRNOV, University of Wisconsin - Madison — The nonlinear evolution of two-fluid tearing modes in a cylindrical pinch is investigated with the NIMROD code. Nonlinear single helicity evolution is examined by constraining the number of unstable modes with a small aspect ratio. Without ion gyroviscosity, the saturated island size and the combined nonlinear Hall and MHD dynamo profile are relatively independent of the ion sound gyroradius, ρ_s, and the Hall dynamo is broad relative to a linear prediction. However, at large ρ_s, the electron flow is modified into a more global structure, with the characteristic m=1 shift across the axis. This effect is not observed at small ρ_s. With ion gyroviscosity, the saturated island width decreases as ρ_s is increased, indicating that the gyroviscous force opposes the driving forces. The saturation mechanism in the simulations is analyzed, and the amplitude and structure of the dynamo are compared with MST experimental results. Mode coupling and modal energy exchange are examined in a multihelicity case with an experimentally realistic aspect ratio.

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Jacob King
University of Wisconsin - Madison

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