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Transition From Two-Fluid to Resistive MHD Tearing Instability in Slab and Cylindrical Geometries V.V. MIRNOV, A. COLE, C.C. HEGNA, S.C. PRAGER, University of Wisconsin - Madison, Center for Magnetic Self Organization in Laboratory and Astrophysical Plasmas — We report new results on the physics of two-fluid tearing instabilities with particular focus on analytically understanding the transition between the two-fluid and single-fluid MHD regimes. Linear eigenfunctions and quasilinear dynamo terms are calculated in both slab and cylindrical geometry with specific emphasis on edge-resonant m=0 tearing modes in the Madison Symmetric Torus (MST) reversed field pinch experiment. A two-fluid quasilinear theory was originally derived for a sheared slab in [1] and generalized to cylindrical geometry in [2], where the effects of current gradient and field line curvature were analyzed in the electron MHD approximation. To investigate the transition between the different regimes, we extend the previous work to include the effects of ion motion. This allows us to analytically follow the transition from a two-fluid to single-fluid regime. The growth rates and eigenmode profiles are obtained to allow comparison with two-fluid MHD codes, and for interpretation of recent MST measurements of Hall reconnection. *Supported by the U.S.DoE and NSF. [1] V. V. Mirnov, C. C. Hegna, S. C. Prager, Plasma Physics Report 29, 612 (2003) [2] V.V. Mirnov, C.C. Hegna, S.C. Prager, C.R. Sovinec, H. Tian, Proc. of 21st IAEA FEC, Chengdu, China, TH/P3-18 (2006)

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