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Analytical and numerical treatment of drift-tearing modes in plasma slab[1] V.V. MIRNOV, C.C. HEGNA, C.R. SOVINEC, University of Wisconsin-Madison, E.C. HOWELL, Auburn University, Alabama — Two-fluid corrections to linear tearing modes includes 1) diamagnetic drifts that reduce the growth rate and 2) electron and ion decoupling on short scales that can lead to fast reconnection. We have recently developed an analytical model that includes effects 1) and 2) and important contribution from finite electron parallel thermal conduction. Both the tendencies 1) and 2) are confirmed by an approximate analytic dispersion relation that is derived using a perturbative approach of small ion-sound gyroradius ρ_s. This approach is only valid at the beginning of the transition from the collisional to semi-collisional regimes. Further analytical and numerical work is performed to cover the full interval of ρ_s connecting these two limiting cases. Growth rates are computed from analytic theory with a shooting method. They match the resistive MHD regime with the dispersion relations known at asymptotically large ion-sound gyroradius. A comparison between this analytical treatment and linear numerical simulations using the NIMROD code with cold ions and hot electrons in plasma slab is reported.

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