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Nonlinear Diamagnetic Stabilization of Double Tearing Modes in Cylindrical MHD Simulations STEPHEN ABBOTT, KAI GERMASCHEWSKI, Univ of New Hampshire — Double tearing modes (DTMs) may occur in reversed-shear tokamak configurations if two nearby rational surfaces couple and begin reconnecting. During the DTM's nonlinear evolution it can enter an "explosive" growth phase leading to complete reconnection, making it a possible driver for off-axis sawtooth crashes. Motivated by similarities between this behavior and that of the $m = 1$ kink-tearing mode in conventional tokamaks we investigate diamagnetic drifts as a possible DTM stabilization mechanism. We extend our previous linear studies of an $m = 2$, $n = 1$ DTM in cylindrical geometry to the fully nonlinear regime using the MHD code MRC-3D. A pressure gradient similar to observed ITB profiles is used, together with Hall physics, to introduce ω_* effects. We find the diamagnetic drifts can have a stabilizing effect on the nonlinear DTM through a combination of large scale differential rotation and mechanisms local to the reconnection layer. MRC-3D is an extended MHD code based on the libMRC computational framework. It supports nonuniform grids in curvilinear coordinates with parallel implicit and explicit time integration.

Stephen Abbott
Univ of New Hampshire

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