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Toroidal flow effects in 3/2 and 2/1 resistive modes nonlinearly driven by a 1/1 internal kink[1] D.P. BRENNAN, University of Tulsa, S.E. KRUGER, Tech-X Corporation, R.J. LA HAYE, General Atomics — The nonlinear drive from an unstable m/n=1/1 internal kink mode to reconnecting modes on surrounding low order rational surfaces is studied with a varying imposed toroidal flow shear in equilibria which accurately model the DIII-D tokamak. The flow is linear in poloidal flux, and is varied from 0 to $\Omega\tau_A \approx 0.1$. The simulations are described in three stages; the linear, nonlinearly driven and nonlinearly saturated stages. In the linear stage the independent modes exhibit classic flow effects. In the nonlinear driven stage, while below the threshold for locking, small components driven by toroidal coupling exhibit damping and phase shifts with small torques. In the nonlinear saturated stage the n=0 flow is strongly modified as various components lock to each other and phases exhibit long timescale oscillations, the details of which depend on the linear stability and equilibrium flow. The nonlinear 3-D resistive magnetohydrodynamic code NIMROD is used for the analysis, which includes the effects of strong anisotropic heat conduction.

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