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Toroidal Coupling of Tearing Modes in RFP[1] V.V. MIRNOV, University of Wisconsin-Madison, C.C. KIM, University of Washington, Seattle — Strong ion heating and plasma momentum transport are observed during periodic magnetic relaxation events in the Madison Symmetric Torus (MST) RFP experiments. Two types of tearing modes are responsible for impulsive reconnection: m =1 modes in the plasma core and m = 0 edge resonant modes. Their coupling can be caused by toroidal effects or nonlinear interaction. In order to distinguish these two mechanisms we investigate the spatial structure of the core and edge resonant tearing modes in the toroidal geometry using the initial value code NIMROD. Substantial toroidal asymmetry is found at the MST aspect ratio R/a =3 for the edge resonant mode. The asymmetry is strong for the radial component, $B_r^{(inboard)}/ B_r^{(outboard)} \sim$ 8, and less significant for the poloidal and toroidal components (∼1.5-2). The use of the linear version of NIMROD is justified by noting that slowly varying magnetic perturbations have robust spatial structure which is weakly sensitive to the mechanism – linear or nonlinear – of the mode excitation. These arguments are confirmed by good agreement with the experimental profiles.

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