Abstract Submitted
for the APR06 Meeting of
The American Physical Society

Spontaneous tearing instability of m=0 modes in the RFP[1] V.V. MIRNOV, University of Wisconsin and Center for Magnetic Self-Organization in Lab and Astrophysical Plasmas — Standard RFP discharges in the Madison Symmetric Torus (MST) exhibit cyclic sawtooth oscillations associated with core (m=1, n=6,7) and edge (m=0, n=1) resonant tearing modes. It is believed that the core tearing modes are spontaneously unstable while linearly stable m=0 modes are nonlinearly driven by coupling to core resonant modes. This scenario of forced m=0 magnetic reconnection is based on robust linear stability properties demonstrated in the past by various Δ' calculations. These earlier results have indicated that the m=0 tearing mode is mainly stable. Recent MST experiments have shown[1] that in some regimes with improved plasma confinement the m=0 mode becomes linearly (spontaneously) unstable. This motivated our interest in revisiting the m=0 tearing mode analysis including a broader range of current profiles. We introduced a three-parameter cylindrical model which permits to vary the radial position and the width of the current gradient independently and found a wide class of unstable current profiles. We report on ideal MHD Δ' analysis as well as the results obtained from a cylindrical resistive eigenvalue code. [1] S.H.Choi et al., submitted to Phys. Rev. Lett.

[1]The work is supported by NSF and DOE

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Date submitted: 13 Jan 2006 Electronic form version 1.4