Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Nonlinear three-dimensional simulations of resistive wall modes with flow MASAHIKO SATO, NORIYOSHI NAKAJIMA, National Institute for Fusion Science — Nonlinear resistive wall modes (RWMs) in low beta cylindrical tokamaks are simulated by using the reduced MHD equations. The pseudo-vacuum model is used, where the vacuum is replaced by a highly resistive plasma. First, we will show single helicity results. When the initial poloidal rotation is small, the 'wall mode,' which is nearly locking to the resistive wall, is unstable. As the initial poloidal rotation become large, 'plasma mode,' which is rotating against the resistive wall, becomes unstable. The electromagnetic torque damps the poloidal rotation. For 'wall mode', the torque increases as the initial poloidal rotation becomes large. In this case, the final saturation level dose not depend on the initial poloidal rotation frequency due to reduction in the poloidal rotation near the plasma edge. On the other hand, for 'plasma mode,' the torque decreases as the initial poloidal rotation. Thus, the poloidal rotation remains in the nonlinear stage and the final saturation level decreases. Next, we will show multi helicity results. Magnetic field line stochastization is obtained due to nonlinear coupling (m,n)=(3,1) mode and (m,n)=(5,2) mode. Effect of poloidal rotation on the extent of the stochastic region will be shown.

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Date submitted: 27 Jul 2005 Electronic form version 1.4