Abstract Submitted
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Extended MHD Effects on RMPs and ELMs[1] H.R. STRAUSS, G.-Y. PARK, C.S. CHANG, NYU, L. SUGIYAMA, MIT, J. BRESLAU, PPPL, R. MAINGI, ORNL — M3D studies of Resonant Magnetic Perturbations (RMP) in DIII-D equilibria indicate that in the absence of plasma rotation, the vacuum RMP magnetic field penetrates the plasma and causes the magnetic field to be stochastic in a wide layer. Parallel thermal conduction cools the plasma in the stochastic layer. When the plasma rotates toroidally and / or poloidally, with sufficient speed, the RMP penetrates only a thin edge layer. The pressure gradient is reduced in this layer, which can stabilize Edge Localized Modes (ELMs). This resembles the behavior of RMPs when there is high edge collisionality, $\nu_* > 1$. There is advection of density at the edge, as well as some density reduction in the plasma core, but not the large density pump out that has been observed at low edge collisionality $\nu_* < 1$. In NSTX, RMPs have been found ineffective in ELM suppression. Applying an RMP can cause ELMs to occur in an otherwise ELM free discharge. It is possible that these ELMs in NSTX are produced by resistive tearing and ballooning modes. Resistive modes can be stabilized by two fluid drifts. The stabilization depends on edge collsionality. It is possible that the RMP cools the edge and increases collisionality, destabilizing the resistive ELMs.

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