Abstract Submitted
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Edge biasing effects on MHD instabilities and plasma response to external magnetic perturbations in HBT-EP BRYAN DEBONO, DAVE MAURER, MICHAEL MAUEL, JEFF L., DAISUKE S., NIKO R., GERALD NAVRATIL, Columbia University, SARAH A., PAT B., THOMAS PEDERSEN, HBT-EP TEAM — A biased electrode inserted into a tokamak plasma edge can be used to apply torque on the plasma and change the rotation rate of MHD instabilities, including the resistive wall mode (RWM). RWM's in HBT-EP have a natural frequency of +4-9 kHz, however with appropriate bias the plasma rotation can be adjusted both positively and negatively. We present a study of the effect of biased plasma rotation on MHD instabilities; a comparison is made between plasma rotation rate and the plasma response to external resonant magnetic perturbations (RMP). The Boozer tokamak plasma reluctance equation $\rho = -(\frac{1}{s-i\alpha}+1)\frac{1}{L_p}$ suggests that the plasma response to RMP's is greatly enhanced as the toroidal torque dissapation coefficient $\alpha \rightarrow 0$. Moderate biasing ($\approx$ 50V) slows down the RWM rotation to 2-3kHz, and an increase in the plasma responsivity to RMP's is seen. Strong positive bias ($\approx +300V$) accelerates the mode in the direction opposite to its natural rotation at $\approx$ -40 kHz. At this high rotation frequency the mode is being dragged at too rapid a rate for it to penetrate the wall. Therefore, the conducting shells behave like an ideal wall and a saturated ideal external kink is observed instead of a RWM.

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