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Feed-back control of 2/1 locked mode phase: experiment on DIII-D and modeling for ITER[1] W. CHOI, K.E.J. OLOFSSON, R. SWEENEY, F.A. VOLPE, Columbia University — A model has been developed for ITER to predict the dynamics of saturated $m/n = 2/1$ tearing modes subject to various torques. The modes, with finite moment of inertia, are modeled as surface currents interacting with error fields, applied magnetic perturbations generated by internal and external non-axisymmetric coils, the vacuum vessel, and the first wall. Using this model, a feed-back controller has been designed to control the phase of locked modes. As predicted by simulation, experimental results on DIII-D show a simple fixed-gain controller can impose a desired constant phase or entrain the mode at a desired constant frequency (e.g. 20 Hz). For a given current in the control coils, a maximum entrainment frequency exists and is dependent on island width. The performance of such a controller in ITER is hereby simulated. The controller is expected to be useful in assisting island suppression with electron cyclotron current drive, as well as to prevent large amplitude locked modes and possible disruption.

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