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Global Mode Stability and Active Control in NSTX[1] S.A. SABBAGH, J.W. BERKERY, J.M. BIALEK, Columbia U., R.E. BELL, D.A. GATES, S. GERHARDT, B. LEBLANC, J. MANICKAM, J.E. MENARD, PPPL, R. BETTI, B. HU, U. Rochester — Active feedback is being used in various NSTX experiments to control mode-induced disruptions. Feedback on sensors measuring toroidal mode number n = 1 was used to control resistive wall modes (RWM) that onset at intermediate levels of plasma rotation and normalized beta near or above the ideal no-wall limit. The RWM can convert to an internal kink that either quickly damps, or leads to tearing modes that saturate or damp. In contrast, plasmas have been passively stabilized with zero rotation at the q = 2 surface, challenging the idea that RWM stability at low rotation ensures stability at higher rotation. Kinetic modification to ideal stability theory can show reduced RWM stability at intermediate plasma rotation speed using experimentally reconstructed equilibria. Rotation profiles are varied by n > 1 field correction or magnetic braking. Lithium evaporation also produced unusually broad rotation profiles. Non-resonant magnetic braking was demonstrated with an n = 2 field configuration and found to be stronger in plasmas where lithium evaporation was used.

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