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NSTX ELM and RWM control experiments and modeling for ITER R.J. HAWRYLUK, S.A. SABBAGH, R. MAINGI, J. BIALEK, J.M. CANIK, S.P. GERHARDT, J.E. MENARD, J.-K. PARK, NSTX RESEARCH TEAM — In light of the importance of mitigating edge localized modes (ELMs) in ITER, NSTX has recently studied the effects of resonant magnetic perturbations (RMPs) on ELM stability. Ideal Perturbed Equilibrium Code (IPEC) simulations indicate that the empirically determined ergodization criterion (Chirikov parameter > 1 across pedestal) is readily achieved using NSTX external mid-plane RMP coils. However, NSTX experiments using a range of applied toroidal mode numbers indicate ELMs are modified but not stabilized in ELMy discharges and can be destabilized in long-lived ELM-free discharges. Importantly, RMP ELM-pacing can reduce impurity accumulation in ELM-free H-modes. No strong changes in the edge T_e or n_e profiles are observed during RMP, but the rotation is observed to decrease. These results and IPEC simulations are consistent with the need for both mid-plane and off-midplane RMP coils in ITER to minimize edge rotation damping. The proposed ITER RMP coil set is also predicted to be effective for RWM control, and VALEN simulations indicate that ITER Scenario 4 can be stabilized up to β_N of 3.7 (well above no-wall limit of 2.5) with modest power and current requirements.

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