Abstract Submitted
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Adaptive ELM Control and Real-Time Feedback MHD Spectroscopy at KSTAR[1] EGEMEN KOLEMEN, R. SHOUSHA, Princeton University, A. NELSON, N. LOGAN, J. PARK, PPPL — KSTAR experiments showed the path dependence and hysteresis of plasma confinement and performance recovery: even for the same final perturbing 3D currents, starting with higher initial 3D currents leads to lower recovery down the path. This demonstrates the need for a control system to keep the ITER RMP perturbations close to the ELM suppression threshold at all times. To this aim, a comprehensive adaptive real-time (rt) ELM control system that exploits key properties of ELM physics, RMP ELM suppression physics, and set of diagnostic inputs to make real-time decisions about the control of multiple actuators to sustain ELM suppression / mitigation is implemented at KSTAR. MHD spectroscopy allows finding the plasma response to 3D coils which can then be used to calculate plasma stability. Historically, multiple sine waves with different frequencies in a feedforward fashion are applied which is time-consuming (˜seconds) making this method unsuitable for rt-control. We implemented a novel feedback based MHD spectroscopy algorithm at KSTAR, the system uses the rt-measurements and changes the applied 3D perturbations as the plasma responds to these perturbations. This leads to fast and stable plasma response identification. We show the results of the initial tests of these controls in KSTAR experiments and discuss the applicability to ITER.

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