Abstract Submitted
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Fast rampdown and disruption avoidance studies on DIII-D and EAST[1] J.L. BARR, L. BARDOZCI, X. DU, N.W. EIDIETIS, D. HUMPHREYS, B. SAMMULI, GA, Z.P. LUO, J.P. QIAN, B. XIAO, Q.P. YUAN, E. LI, ASIPP, E. KOLEMEN, PPPL, C. REA, MIT — Improved standard and emergency shutdown methods have been developed in DIII-D over a large piggyback experiment varying shutdown techniques, with measured improvement in disruptivity rates. The experimental survey used the shutdown phase of >1000 plasmas in the '17-'19 DIII-D campaigns. The disruptivity of single-null plasmas was minimized with relatively fast I_p ramp-down rates of 2–3 MA/s while maintaining neutral beam heating comparable to the radiated power for the majority of shutdown. Transitioning to a limited shape for shutdown further reduced disruptivity to <10% compared to the DIII-D historical rate of 28%. Emergency shutdown of DIII-D ITER Baseline Scenario plasmas after locked modes is a special challenge. All of 46 such attempts with continued diverted topology disrupted before reaching safe normalized currents (˜0.3 for ITER). However, 2 of 3 limited emergency shutdowns did avoid disruption, motivating further testing in the '19 campaign. Experiments on the EAST tokamak have likewise identified robust, fast, ramp-down techniques. These included diverted and limited shutdowns up to 0.7 MA/s with sustained lower hybrid power. In the '19 DIII-D campaign, the shutdown study will be expanded to develop and rigorously test disruption avoidance techniques, with a special focus on tearing and locked modes, and initial results will be presented.

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