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Implementing a Finite-State Off-Normal and Fault Response System for Robust Tokamak Operation[1] N.W. EIDIETIS, D.A. HUMPHREYS, B. SAMMULI, M.L. WALKER, GA — The initial implementation and testing of a finite state off-normal & fault response (ONFR) system on the DIII-D and KSTAR tokamaks is presented. Robust ONFR will be critical to the operation of ITER as the physical consequences of unexpected events will be far more extreme than in present devices. "Off-normal" refers to unexpected plasma events (e.g. disruptions) and plasma events that are expected but still require asynchronous response (e.g. neoclassical tearing modes). "Fault" refers to hardware failure. ONFR priorities are to (1) protect the device from damage, (2) minimize recovery time between shots by avoiding unnecessary initiation of mitigation procedures, and (3) maximize the useful pulse length of a given shot by providing for discharge recovery after deleterious events. The detailed implementation of finite-state ONFR using Matlab/Simulink and Stateflow exported to the DIII-D and KSTAR plasma control systems is described, as are initial tests of multi-stage locked mode handling on both devices.

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