Development of ITER-Relevant Plasma Control Solutions at DIII-D* **FT**

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The requirements of the DIII-D physics program have led to the development of many operational control results with direct relevance to ITER. These include new algorithms for robust and sustained stabilization of neoclassical tearing modes (NTM) with electron cyclotron current drive (ECCD) [1], model-based controllers for stabilization of the resistive wall mode (RWM) in the presence of edge localized modes (ELMs) [2], coupled linear-nonlinear algorithms to provide good dynamic axisymmetric control while avoiding coil current limits, and adaptation of the DIII-D plasma control system (PCS) [3] to operate the next-generation superconducting tokamaks, KSTAR [4] and EAST [5]. Development of integrated plasma control, a systematic approach to model-based design and controller verification, has enabled successful experimental application of high reliability control algorithms requiring a minimum of machine operations time for testing and tuning. The DIII-D PCS hardware and software and its versions adapted for other devices can be connected to integrated plasma control simulations to confirm control function prior to experimental use. This capability has been critical to control system implementation for tokamaks under construction.

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