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Model-based Adaptive Control of Resistive Wall Modes in DIII-D[1] F. XIE, E. SCHUSTER, Lehigh University, D.A. HUMPHREYS, M.L. WALKER, General Atomics — One of the major non-axisymmetric instabilities under study in the DIII-D tokamak is the resistive wall mode (RWM), a form of plasma kink instability whose growth rate is moderated by the influence of a resistive wall. The General Atomics/FARTECH DIII-D/RWM dynamic model represents the plasma surface as a toroidal current sheet and the wall using an eigenmode approach. We report first on the experimental validation and reconciliation of the proposed dynamic model, which is a required step previous to the potential implementation in the Plasma Control System (PCS) of any model-based controller. The dynamic model is then used to synthesize an adaptive control law for the stabilization of the RWM under time-varying β conditions. Simulation results are presented comparing the performance of the model-based adaptive controller and present non-model-based PD controllers.

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