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Robust Control of the Spatial Current Profile in the DIII-D Tokamak[1] J. BARTON, E. SCHUSTER, Lehigh University, M.L. WALKER, D.A. HUMPHREYS, General Atomics — Advanced tokamak operating scenarios, characterized by large noninductively driven plasma currents, typically require active regulation of a specific current density profile. Non-model-based control of the q profile has been tested at DIII-D. However, some present limitations of the controller motivate the design of a model-based controller that accounts for the dynamics of the whole q profile in response to the control actuators. A control-oriented model of the current profile evolution in DIII-D was recently developed and used to design feedforward control schemes. In order to reject the effects of external disturbances to the system, a feedback control input needs to be added to the feedforward input. In this work, we report on the design of a robust feedback controller, on the implementation of the combined model-based feedforward + feedback controller in the DIII-D Plasma Control System, and on the experimental validation of the combined controller in the DIII-D tokamak.

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