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Theory Experiment

Development of Model-Based Feedback Control for the Current Profile in DIII-D,* Y. Ou, C. Xu, E. Schuster, *Lehigh U.*; T.C. Luce, J.R. Ferron, M.L. Walker, D.A. Humphreys, *GA*; T.A. Casper, W.H. Meyer, *LLNL* – A key goal in control of an advanced tokamak (AT) discharge is to maintain safety factor (q) and pressure profiles that are compatible with MHD stability at high beta and at high fraction of bootstrap current. This will enable high fusion gain and non-inductive sustainment of the plasma current for steady-state operation. Active feedback control of the q profile evolution at DIII-D has been already demonstrated [1], and an open-loop control scheme has been proposed [2]. We report up-to-date progress towards enabling model-based active control of the current profile during the plasma current ramp-up phase. New results on closed-loop control design, simulation assessment with Corsica, and initial open-loop-control experiments are presented.

- [1] J.R. Ferron, et al., Proc. 32nd EPS Conf. on Plasma Physics, vol. 29C (2005) 1069.
[2] Y. Ou, et al., Proc. Am. Control Conf., New York (2007).

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