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Category Number and Subject: 6.1.3 Plasma Control Systems or 5.6.2 DIII-D Tokamak

Theory Experiment

Control of the Current Profile Evolution During the Ramp-Up Phase at DIII-D,* Y. Ou, E. Schuster, *Lehigh U.*, J.R. Ferron, T.C. Luce, M.L. Walker, D.A. Humphreys, *General Atomics*; T.A. Casper, W.H. Meyer, *LLNL* – Setting up a suitable current profile has been demonstrated to be a key condition for advanced scenarios with improved confinement and possible steady-state operation. Experiments at DIII-D focus on creating the desired q profile during the plasma current ramp-up and early flattop phases with the aim of maintaining this profile during the subsequent phases of the discharge. Active feedback control of the q profile evolution at DIII-D has already been demonstrated [1], and an open-loop control scheme has been proposed [2] based on a simplified control-oriented dynamic model [3]. The use of Corsica for both control testing and design is reported, and results of open-loop current profile control experiments are presented.

[1] J.R. Ferron, et al., *Nucl. Fusion* **46** (2006) L13.

[2] Y. Ou, et al., *Proc. Am. Control Conf.*, New York (2007).

[3] Y. Ou, et al., *Fusion Eng. & Design* **82** (2007) 1153.

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