Abstract Submitted for the Forty-Sixth Annual Meeting
Division of Plasma Physics
November 15–19, Savannah, Georgia

Category Number and Subject: 5.6.2 DIII-D Tokamak

[**x**] Theory [~] Experiment

Characteristics of Feedback for Stabilization of the Resistive Wall Mode in DIII-D Geometry,* M.S. Chu, G.L. Jackson, *General Atomics*, Y.Q. Liu. *Chalmers U.*, A.M. Garofalo, *Columbia U.*, M. Okabayashi, *PPPL*, and the DIII-D RWM Team –
The characteristics of feedback stabilization of the resistive wall mode (RWM) in the DIII-D geometry is studied using the MARS-F code[1]. For the double-rowed internal coil (I-coils), the effect of the phasing angles of the upper and lower I-coils on stabilization of the RWM is studied. Deviation from the optimum angle beyond 90 degrees is found to result in destabilization of the plasma and related to disruption. Pade approximations of the transfer functions are analyzed using the Nyquist diagram, both diagram and root trajectories. The plasma is readily stabilized with the optimum phasing angle and ideal feedback conditions. When coupled with experimentally measure characteristics[2] of the external amplifier, a maximum of C_β = 40% is predicted in agreement with the observed range. The limit is related to the inherent phase lag introduced by the amplifier. Improvements from alternative amplifier designs are also studied.

[1]Y.Q. Liu, et al., Phys. Plasmas **7**, 3681 (2000).
[2]A.M. Garofalo, et al., Phys. Plasmas **9**, 4573 (2002).

*Supported by U.S. DOE under DE-FG03-95ER54309, DE-FG02-89ER53297, and DE-AC02-76CH03073.