

**Abstract Submitted for the Forty-Eighth Annual Meeting
Division of Plasma Physics
October 30th-November 3, 2006, Philadelphia, Pennsylvania**

Category Number and Subject: 5.6.2. DIII-D Tokamak

[] Theory [X] Experiment

Overview and Plan of FAR-TECH RWM Identification Via Kalman Filter and Implementation of Model-Based Feedback Control,* J.S. Kim, Y. In, I.N. Bogatu, J. Kim, *FAR-TECH. Inc.*, M.S. Chu, D.A. Humphreys, G.L. Jackson, R. Johnson, R.J. La Haye, E.J. Strait, M.L. Walker, A.S. Welander, *GA*, A.M. Garofalo, H. Reimerdes, *Columbia U.*, M. Okabayashi, *PPPL* – FAR-TECH is developing, implementing, and validating real-time resistive-wall-mode (RWM) identification algorithms and model-based RWM feedback algorithms on DIII-D. For RWM identification, a numerically simulated spatial pattern of the sensor signals (matched filter) can be matched to the measured sensor signals in real-time. Temporal behavior of the RWMs is further utilized by a Kalman filter in the identification to discriminate them from other noise/modes, i.e. edge localized modes. We will present modeling of the RWM signals at sensor locations by FARVAC, implementation of RWM identification algorithms on DIII-D, internal RWM mode structure identification, feedback controller algorithms, and ongoing validation results. Our new effort on identification of RWMs with toroidal modes for $n > 1$ will be discussed.

*Supported by US DOE under DE-FG02-03ER83657, DE-FG03-95ER54309, DE-FC02-04ER54698, DE-FG02-89ER53297, and DE-AC02-76CH03073.