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Category Number and Subject:

☐ Theory ☐ Experiment

Development of State-Space Model-Based Kalman Filter for $n \geq 1$ Resistive Wall Mode (RWM),* Y. In, J.S. Kim, J. Kim, *FAR-TECH. Inc.*, D.A. Humphreys, G.L. Jackson, R.D. Johnson, R.J. La Haye, E.J. Strait, M.L. Walker, *GA*; A.M. Garofalo, H. Reimerdes, *Columbia U.*, M. Okabayashi, *PPPL*; E. Schuster, *Lehigh U.* – While significant progress has been made for $n=1$ RWM identification and control, it is now predicted that $n>1$ RWMs could appear even after the $n=1$ RWM is suppressed. Algorithm development, as well as diagnostic capability enhancement, is being done in order to identify the $n=2$ or 3 RWMs in the presence of a stabilized $n=1$ RWM for DIII-D. Specifically, taking advantage of the successful development of Kalman filter to discriminate ELM noise from an $n=1$ RWM [1], a more advanced Kalman filter is being developed to detect both $n=1$ and $n > 1$ RWMs. Noise characterization and modeling is deemed critical to determine the optimized Kalman gain. This multi-mode state-space model will also serve as a basis to design a model-based RWM feedback controller.

[1] Y. In *et al.*, Phys. Plasmas **13**, 062512 (2006).

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