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VALEN RWM Control Modeling: Kalman Filtering for Noise Reduction and Reduced State Space Descriptions*[1] O.N. KATSURO-HOPKINS, G.A. NAVRATIL, J. BIALEK, D.A. MAURER , Columbia University
— Resistive wall kink modes (RWM) are an important performance-limiting instability for magnetic confinement fusion systems. The growth rate of the ideal kink mode is slowed as it electromagnetically interacts with nearby conducting walls. The result is a RWM grows on the resistive time scale of the wall. A feedback control system can be designed to further reduce the growth rate of the RWM and stabilize the instability. The VALEN computer code was designed to accurately model and study different RWM feedback control scenarios [1]. Kalman filtering techniques are being investigated to obtain improvements in control system performance and reduction in power requirements for feedback suppression of the RWM. Significant reduction in the required control system voltage was demonstrated for a simple wall, control, and sensor coil model. Recent work on Kalman filter implementation in both full and reduced state space models of DIII-D and the proposed International Thermonuclear Energy Reactor (ITER) will be presented using a realistic noise model based on actual experimental DIII-D data.
1. J. Bialek, et al., Phys. of Plasmas, 8, 5, 2170, (2001)

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