

Abstract Submitted
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A Kalman Filter for Feedback Control of Rotating External Kink Instabilities in a Tokamak Plasma¹ J.M. HANSON, R. JAMES, M.E. MAUEL, D.A. MAURER, G.A. NAVRATIL, T.S. PEDERSEN, Columbia University — A Kalman filtering algorithm is proposed for feedback control of rotating external kink modes on the HBT-EP experiment. The Kalman filter contains an internal model that captures the dynamics of a rotating, growing mode. The filter actively compares the results of its model with real-time measurements to produce an optimal estimate for the mode's amplitude and phase. Numerical simulations using a model for the RWM consistent with experimental observations on HBT-EP show that Kalman filter feedback can suppress the unstable mode more quickly and with less control effort than less sophisticated controller algorithms. The Kalman filtering algorithm has been implemented on a set of low-latency, field-programmable gate array (FPGA) controllers and tested in closed-loop operation with RWM-unstable plasmas. Progress in using the Kalman filter to suppress unstable kink activity in HBT-EP plasmas will be reported.

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