

Abstract Submitted  
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**Kalman Filter for the Real Time Estimation of the Vertical Position of C-Mod Plasmas** M. FERRARA, I. HUTCHINSON, S. WOLFE, J. STILLERMAN, T. FREDIAN, MIT PSFC — A Kalman filter has been implemented for the real-time estimation of the vertical position of C-Mod plasmas. The simulator Alcasim, which reproduces the full evolution of a discharge, is used to synthesize the filter matrices at a time point. The linear model is then employed in the filter for the full duration of the flattop and for different target plasmas, in order to test for robustness. The filter has been extensively tested in linear and full Alcasim simulations. The performance in terms of noise rejection and signal distortion is evaluated in comparison with standard filtering such as lowpass and bandpass. Results show excellent signal tracking and noise rejection. For real-time implementation, computation speed is also a requirement, therefore issues such as off-line training of the filter and linear model reduction are investigated. The experimental test of the filter in the C-Mod fast vertical control loop is expected shortly. This could demonstrate a possible solution to the problem of control degradation and AC losses expected on ITER because of measurement noise. USDoE award DE-FC02-99ER54512.

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