

Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Alcasim Axisymmetric Simulation Code for Noise and Stability Analysis on Alcator C-Mod M. FERRARA, I. HUTCHINSON, S. WOLFE, J. STILLERMAN, T. FREDIAN, MIT PSFC — Tokamak control is an active research area as the next generation reactors will need active suppression of local and global instabilities within actuator constraints, as well as adaptive handling of off-normal scenarios. The complexity of the control issues and the risk of direct testing on the hardware call for accurate and fast simulators targeting the control problem at hand. Alcasim is a simulator developed for C-Mod with the specific purpose of studying the axisymmetric stability of elongated plasmas in the presence of power supply saturation. The code is highly optimized so that Alcasim is suitable for parametric investigation of the controller gains. Alcasim has been used to study the vertical oscillations seen early in C-Mod discharges when plasmas are fairly elongated. Analysis of real data supported by extensive simulation show that plasmas occasionally travel through regions of instability for which the controller gains need further optimization. Work is ongoing for a systematic and efficient approach to optimal gain calculation, to be possibly employed in real time gain scheduling. USDoE award DE-FC02-99ER545512.

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Date submitted: 23 Jul 2006

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