

Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Active Feedback Control of Global Turbulence with Multiple Localized Controllers¹ T. MAXIMILLIAN ROBERTS, MICHAEL MAUEL, MATTHEW WORSTELL, DARREN GARNIER, Columbia, JAY KESNER, MIT, CTX TEAM, LDX COLLABORATION — The CTX device is a laboratory magnetosphere confining low density, interchange unstable plasmas which exhibit fully developed turbulent dynamics. A feedback system designed to measure potential fluctuations and apply a variably phase shifted response has been found to amplify or suppress this turbulence. Through multiple azimuthal measurements of floating potential, we see that the influence of the feedback system is localized, amplifying feedback having a larger spatial extent than suppressive. By installing another identical and independent feedback system 180 degrees from the first, we have significantly enhanced global suppression of turbulence. We also discuss the adaptations to previous work on a high performance simulation which evolves the coupled non-linear PDEs that model (i) the gyro-kinetic electrons, (ii) cold fluid ions and, (iii) the time rate of change of the potential associated with interchange fluctuations. By including a representation of the feedback system in this simulation we hope to see a response similar to that measured experimentally.

¹Supported by the NSF-DOE Partnership in Plasma Science.

T. Maximillian Roberts
Columbia

Date submitted: 11 Jul 2013

Electronic form version 1.4