Abstract Submitted
for the APR12 Meeting of
The American Physical Society

Control of ideal and resistive magnetohydrodynamic instabilities in reversed field pinches with 2 resistive walls by sensing three components of B KARL SASSENBERG, University of Tulsa, Tulsa, Oklahoma 74104, USA, ANDREW S. RICHARDSON, Naval Research Laboratory, Washington DC 20375, USA, DYLAN P. BRENNAN, University of Tulsa, Tulsa, Oklahoma 74104, USA, JOHN M. FINN, Los Alamos National Laboratory, Los Alamos, New Mexico 87545, USA — Confinement times of fusion plasmas can be greatly enhanced through access to flexible and reliable control of both resistive and ideal plasma modes. Numerical studies are presented of magnetohydrodynamic instability control through sensing and proportional feedback in Reversed Field Pinches (RFPs) with two resistive walls. The feedback signal incorporates all three components of the magnetic field perturbation, each with its own gain factor. This study extends the work of Richardson & Finn (Phys. Plasmas vol. 17, p. 112511 (2010)) and includes an important feature of the RFX-mod experiment, namely two resistive walls with external measurements. In particular, when a single resistive wall scenario is considered, feedback based on sensing the first tangential component (the derivative of the helical flux) inside the wall is found to perform better than when the same component is measured outside the wall. Furthermore, the effect of feedback control on the magnetosonic (MS) mode with two walls is compared to the single resistive wall scenario with the first tangential component measured outside. In the latter case feedback of the second tangential component (the helical field) was found to drive the MS mode unstable.

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Date submitted: 05 Jan 2012 Electronic form version 1.4