Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Experimental Verification of Braginskii's Viscosity in MHD Plasma Jet of Reconnection Scaling Experiment. L. DORF, X. SUN, T. INTRATOR, J. HENDRYX, G. WURDEN, I. FURNO, G. LAPENTA, (LANL) — Braginskii's theory gives a simple and useful expression for ion-ion viscosity in magnetohydrodynamic (MHD) plasmas. While this formula has been used extensively, no experimental verification of it can be found in the literature. A few direct measurements of Fokker-Plank diffusion coefficients have been reported, but ion viscosity has not been recognized in those works. This talk will describe the first experimental evaluation of ion viscosity, performed by measuring and comparing the terms of the MHD momentum balance equation. Namely, time-dependent, 2D profiles of the axial flow velocity, density, electron temperature, and magnetic field components were measured at two axial locations in a plasma column of the Reconnection Scaling Experiment. Significant plasma flow with the velocity on the order of the ion acoustic speed was detected, with the velocity decreasing downstream. The results show that the ion momentum flux is dissipated by the ion-ion viscosity due to a significant radial shear of the axial velocity. Chord-integrated ion temperature measurements performed at several radial locations using Doppler broadening spectroscopy show temperature of about 1eV. Comparison of the measured viscosity with Braginskii's predictions demonstrates a good agreement. Supported by OFES, and DOE/LANL contract DE-AC52-06NA25396.

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Date submitted: 25 Jul 2007 Electronic form version 1.4