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Initial Results from the Madison Plasma Dynamo Experiment DAVID WEISBERG, JOHN WALLACE, CHRISTOPHER COOPER, IVAN KHALZOV, BEN BROWN, CARY B. FOREST, Univeristy of Wisconsin-Madison

— The Madison Plasma Dynamo Experiment (MPDX) is a plasma device designed to explore the self-excitation process across a range of astrophysical dynamos. Numerical simulations have demonstrated that a laminar two-vortex flow in a spherical geometry can produce a dynamo at certain values of fluid Reynolds number (Re) and magnetic Reynolds number (Rm); namely when Rm $\geq$ Re for Re=300. This requirement is sought to be achieved in a large, hot, flowing, and unmagnetized plasma in MPDX. This poster presents results from the first plasma created in MPDX using hot, emissive lanthanum hexaboride (LaB_6) electrodes. The electrodes are biased up to 400V with respect to anodes, drawing current that both heats and stirs the plasma. The design of these electrodes is discussed, as well as the effectiveness of the discharge currents achieved in the presence of the 3000G multipole cusp magnetic field of MPDX. We also present measurements of plasma flow due to ExB stirring, an important requirement for dynamo excitation. Experimental results are compared to numerical predictions of viscous coupling between flow at the magnetized edge and the unmagnetized core as a function of Re. Work supported by DOE and NSF.

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