

Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Experimental investigation of free surface fluctuations and vortex dynamics in MHD flow¹ J. RHOADS, PPPL, J. KUBRICHT, UT Austin, E. EDLUND, P. SLOBODA, E. SPENCE, H. JI, PPPL — A magnetic field imposed on a conducting liquid can significantly alter the dynamics of large and small scale features within the flow. These effects may be critically important in turbulent heat transport for flowing liquid metal walls in a fusion reactor. Experiments have been conducted in the Liquid Metal Experiment (LMX) using a GaInSn eutectic alloy as a working fluid to investigate these effects. These experiments considered free-surface, wide aspect-ratio flow through a channel situated in a strong vertical magnetic field (up to $Ha \approx 50$, where Ha is the ratio of electromagnetic to viscous forces). By tracking the deflection of the free surface in three locations, correlation analysis in both the down-stream and cross-stream directions gave insight into how the fluctuations were affected by the application of the magnetic field. Additionally, vortices created in the wake of an obstruction responded dramatically to the applied field. Experimental results examining the damping of surface fluctuations and the characterization of vortices being shed from an obstruction will be presented.

¹Work supported under contract DE-AC02-09CH11466.

J. Rhoads
PPPL

Date submitted: 05 Aug 2011

Electronic form version 1.4