

Abstract Submitted
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Experimental investigation of heat transfer in free-surface MHD flow¹ J. RHOADS, Princeton University, A. KATZENSTEIN, Eckerd College, E. EDLUND, P. SLOBODA, E. SPENCE, H. JI, PPPL — The presence of a strong external magnetic field can significantly alter the dynamics of large and small scale features within the flow. In particular, turbulent eddies with vorticity non-parallel to the magnetic field are strongly damped. This anisotropization of the turbulence may be critically important for heat transport in 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 flows up to 20 cm/s through a channel situated in a magnetic field up to 2 kG, corresponding to a Reynolds number up to $Re \approx 10^4$ and a Hartmann number up to $Ha \approx 50$. Resistive heaters were placed on the free surface and the fluid temperature downstream was monitored by an array of thermocouples and an infrared camera. The relationship between Nusselt number and Hartmann number will be presented.

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