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Magneto hydrodynamic Vortex Behavior in Free-Surface Channel

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— Flowing liquid plasma-facing systems have been proposed for fusion devices due to their structural consistency and capability to withstand enormous heat fluxes. In support of these designs, the effects of magnetic field on the thermal mixing of conductive fluids need to be studied and understood. The Princeton Liquid Metal Experiment (LMX) consists of a free-surface, externally driven channel flow subjected to a strong vertical magnetic field. LMX uses an infrared camera and non-intrusive heat signatures to visually study the vortex street of a vertical cylinder while an array of potential probes has been installed to map the velocity profile for varying magnetic field strengths. Our studies show a decrease in surface activity with increasing field strength as well as distinct changes in vortex behavior. Velocity distributions across the channel are compared with infrared observations and the relationship between Strouhal number and magnetic field strength is examined.

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