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Hydromagnetic Taylor-Couette Experiments in Liquid Sodium DANIEL ZIMMERMAN, BARBARA BRAWN, DANIEL LATHROP, University of Maryland Physics/IREAP — We present results from experiments in liquid sodium flow between a stationary 30cm diameter stainless steel cylinder and a rotating 15cm diameter copper plated aluminum cylinder, both 30cm long. The inner cylinder is driven at an angular frequency Ω to access a range of magnetic Reynolds number $R_m = \frac{\Omega R_i L_{gap}}{\eta}$ between 0.9 and 13 and an axial magnetic field B_0 is applied achieving an interaction parameter (Stuart number) $N = \frac{B_0^2 L_{gap}}{\rho \mu_0 \eta \Omega R_i}$ between about 0.02 and 14. Hall probe array measurements of induced magnetic field and ultrasound measurements of velocity show significant influence of the applied magnetic field on the turbulent basic flow. This includes the emergence of coherent oscillations in both the induced magnetic field and velocities in some regions of parameter space. Understanding the interplay between magnetic fields and flows of conducting liquids in this geometry has broader applicability to astrophysical problems such as flow in accretion disks.

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