Abstract for an Invited Paper
for the APR06 Meeting of
The American Physical Society

Magnetorotational and dynamo instabilities in liquid sodium experiments[1]

DANIEL LATHROP, University of Maryland

Experiments conducted in liquid sodium confined between a rotating inner sphere and a concentric outer sphere show a host of MHD behavior. With a sufficiently strong external coaxial magnetic field, this system exhibits the magnetorotational instability. The primary instability shows a continuous bifurcation to a rotating $m = 1$ pattern in the magnetic field, and concomitant oscillations in the velocity field. By varying both the rotation rate and the external magnetic field (made dimensionless as the magnetic Reynolds number and the Lundquist number respectively), we have navigated the parameter plane to observe a number of states with distinct dominant wavenumber and parity. The onset conditions compare favorably with expectations from linear stability calculations. This is remarkable considering the significant background turbulence (15% to 25% turbulent intensity) in the base state. Finally we have explored the suitability of spherical Couette flow to show dynamo action.

[1]This research is supported by the National Science Foundation