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Diagnostic Systems of the Princeton MRI Experiment E.M. EDLUND, H. JI, K. GAROT, M.D. NORNBERG, A.H. ROACH, E.J. SPENCE, Center for Magnetic Self-Organization, PPPL — The MRI experiment at the Princeton Plasma Physics Laboratory is a Taylor-Couette device for the study of rotational instabilities in sheared flows of a magnetized liquid metal GaInSn alloy [1]. Four components of the containment vessel (the inner and outer cylinders, and segmented top and bottom plates) may be rotated independent of each other to tailor the fluid rotation profile. External azimuthal coils produce vertical magnetic fields up to 5 kG. The primary signatures of rotational turbulence are found in the fluctuations of the magnetic field and fluid velocity. An array of 72 externally mounted magnetic pick-up coils detects global magnetic perturbations and can distinguish low order axial and azimuthal mode numbers. A proposed additional coil may be mounted in a fin and inserted into the fluid for measurement of local magnetic perturbations. An outer wall mounted transducer, acting as both transmitter and receiver, operates at 4 MHz in a pulse-echo configuration and measures both the equilibrium and fluctuating fluid velocity. We will present plans for a novel diagnostic to measure the torque at the fluid-wall interface, employing strain gauges between the outer wall and a coaxial sleeve. Work supported by the US DOE, NASA and the NSF.

[1] E. Schartman, H. Ji and M.J. Burin, RSI 80, 24501 (2009).

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