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Hydrodynamic MagnetoRotational Instability Analog Experiment STEVEN STEMMLEY, University of Illinois Urbana-Champaign, ERIC BLACKMAN, University of Rochester, KYLE CASPARY, ERIK GILSON, DEREK HUNG, Princeton Plasma Physics Laboratory, HANTAO JI, Princeton Plasma Physics Laboratory, Princeton University, PETER SLOBODA, Princeton Plasma Physics Laboratory — The MagnetoRotational Instability (MRI) is thought to be responsible for angular momentum transport in accretion disks. This transport occurs when two magnetically coupled fluid elements are perturbed and radially stretch the sufficiently weak magnetic field. To mimic these astrophysical systems, a modified Taylor-Couette device was operated with water as the working fluid at varying rotation speeds to produce hydrodynamic quasi-Keplerian flows and with a pair of test masses coupled by a spring rather than a magnetic field. This scaled experiment simulates the spring-like forces between fluid elements brought on by magnetic tension. In attempts to visually observe this MRI analog, neutrally buoyant masses of varying size were coupled by means of a spring to a fixed point rotating with the fluid. Laser Doppler Velocimetry showed good agreement with ideal Taylor-Couette velocity profiles and that no significant perturbations were present when the masses were moving at the speed of the flow. Further investigations include varying the masses, springs, and shear profiles to obtain a map of the instability threshold boundary as well as determining the effect of the mass's geometry on the flow. Results from video recording measurements and analyses are presented and discussed.

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