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Circular Couette cell for two-dimensional turbulence experiments in sheared flow: initial results.[1] JOHN V. ULMEN, PAUL W. FONTANA, MARTIN KEARNEY-FISCHER, Seattle University — An experiment to study turbulence in quasi-two-dimensional flows with a controlled mean flow shear has been built. Experiments are underway to investigate the suppression of turbulent transport by sheared flow as seen in geostrophic flows and laboratory fusion plasmas. The apparatus, a circular Couette cell, uses a liquid film of dilute soap solution suspended freely in an annular channel with a rotating outer boundary. The channel is 7 cm wide with an average radius of 46.5 cm, and can be rotated at angular speeds exceeding 10 rad/s. Mean flow profiles will be presented showing the effect of air resistance on the flow; damping lengths on the order of 1 mm are observed. Turbulence is driven independently via electromagnetic forcing. The rate of turbulence injection can be varied continuously, and its spatial scale corresponds to the spatial frequency of an array of NdFeB magnets. Diagnostics include particle imaging velocimetry, two-point laser Doppler velocimetry, and thickness measurements via reflection interferometry. Initial results and plans for upcoming measurements will be presented.

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