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Rayleigh Taylor instability in the solar corona loop experiment[1]
YANG ZHANG, PAKORN WONGWAITAYAKORNKUL, PAUL BELLAN, Caltech — We are observing a Magneto Rayleigh Taylor instability (MRTI) in a laboratory experiment that simulates solar corona loops. Unlike a previous experiment in our lab where MRTI instigated by the effective gravity of a kink instability was observed [1], here the acceleration from the hoop force acting on the loop provides the effective gravity. Detailed measurements indicate a scaling where the observed axial wavelength λ increases when a larger bias magnetic field is used. This scaling is possibly consistent with the theoretical MRTI growth rate $\gamma^2 = gk - \frac{(\mathbf{k}\cdot\mathbf{B_0})^2}{\mu_0\rho}$, because this theoretical growth rate implies that if $\mathbf{k}$is parallel to $\mathbf{B_0}$ (i.e., undular mode), the fastest growing mode has $\lambda = \frac{2\pi}{k} = \frac{4\pi\mathbf{B_0^2}}{\mu_0\rho g}$. We are also exploring other features such as appearance of a kink after the MRTI, different experiment parameters and whether a fast magnetic reconnection happens during this process. [1] A. L. Moser and P. M. Bellan, Nature 482, 379 (2012).

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