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Folding fluid curtains ESTHER WERTZ, JULIEN DERVAUX, Universite de Paris-7, Paris, France, NEIL RIBE, YVES GAMBLIN, Institut de Physique du Globe, Paris, France — A sheet or "curtain" of viscous fluid falling onto a surface forms a pile of regular folds. Using silicone oil falling through a slot at the base of a reservoir, we have performed laboratory experiments to determine how the folding amplitude and frequency depend on the slot geometry, the fall height, the flow rate, and the fluid properties. A scaling analysis of the data that corrects for the surface tension-induced narrowing of the curtain shows that folding can occur in two limiting regimes. At low heights, "gravitational" folding occurs in which the viscous forces that resist folding are balanced by gravity. At great heights, the viscous forces are balanced by inertia ("inertial" folding). At intermediate heights, we observe a transitional regime characterized by frequency multiplicity and hysteresis effects. We interpret these results in terms of the eigenmodes of an oscillating moment-free liquid sheet that is strongly stretched by gravity. We will also present a simple numerical model for the shape of the narrowing curtain, and compare its predictions with our observations.

Neil Ribe
Institut de Physique du Globe de Paris

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