

# Visual Delights I: Interactive Flow Instabilities



**Objective:** Demonstrate Flow Instabilities due to gravity, viscosity differential, and rotation.

**What:** A. Thin enclosure contains dyed glycerin and air.

B. Vertical tube on a turntable contains dyed rheoscopic fluid (water plus pearl-like crystals highly sensitive to local shear).

**How:** A1. Pick up the enclosure from its stand and turn it upside down. Glycerin, the heavier fluid, is now above air and this is unstable. Undulations appear at the fluids' interface and grow, known as *Rayleigh-Taylor Instability*.

A2. Using your fingers press the back to the front near or at glycerin-air interface. The fluids are pressed out of the area. Upon releasing the pressure air (the less viscous fluid) rushes in and forms fingers. The fingering pattern is known as *Saffman-Taylor Instability*.

B. Make sure the tube is in vertical position and inside the four brackets. Flick the white disk (turntable) 3-4 times to cause 20 or so revolutions; then stop. While the fluid decelerates horizontal rings, known as *Taylor Vortices*, appear along the tube.