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**Rayleigh-Taylor flow with two Interfaces: The Completed
Boussinesq Approximation**

The classical Rayleigh-Taylor instability occurs in a system of two horizontal fluid layers separated by an interface. The upper fluid is more dense than the lower one, so that the system is unstable. Any initial disturbance to the interface grows with time; eventually the two fluids exchange positions and nonlinear effects dominate the shape of the evolving interface.

This talk will consider a system of three fluids, separated by two interfaces. This greatly increases the complexity of the flow, and various different flow types are possible, depending on the two density ratios. Linearized theory offers some insight into the stability properties of the system, but ultimately numerical methods are needed to describe the nonlinear interface shapes. This is done here using a recently published “Completed Boussinesq Approximation”, in which the three fluids are viscous and their two interfaces are allowed to overturn and form nonlinear spirals. These will be illustrated in the talk.