Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Exploring the effects of a rigid body on the evolution of the Rayleigh Taylor instability CHRISTOPHER BROWN, STUART B. DALZIEL, University of Cambridge — This talk discusses the effects of a rigid solid boundary impeding the evolution of the Rayleigh-Taylor (RT) instability. Previous experimental studies e.g. those of Linden, Dalziel and Davies Wykes, amongst others, used a solid rigid barrier to separate the two layers which when removed revealed the RT unstable interface. But what happens if the barrier is only partially removed? Initially the interface grows classically, however, this is soon replaced by two circulation cells, one either side of the barrier. The circulation forces fluid from both layers onto the interface at $z = 0$, resulting in a RT mixing zone superimposed onto the circulation cells. This RT mixing zone grows in a manner similar to that found by Andrews et al. for RT in water tunnels, except here the flow is modified by the end wall. Near to the end wall the two circulation cells are deflected vertically, stretching the mixing zone vertically along the end wall rapidly. Using a combination of ILES simulations and low Atwood number experiments this talk will present a model for a multi-stage mixing process, discussing the effects of the opening size on the density change of each layer, buoyancy driven flux through the opening and mixing efficiency.

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Date submitted: 24 Jul 2014 Electronic form version 1.4