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Rayleigh-Taylor instability: An initial condition study TOM FINN, SARAT CHANDRA KUCHIBHATLA, DEVESH RANJAN, Texas A&M University — The Water Channel facility at Texas A&M University was employed to study the effects of initial conditions on Rayleigh-Taylor instability. Different stages of evolution of the unstable stratification of hot and cold water streams are experimentally recorded using planar imaging techniques and thermocouples. The Atwood number corresponding to a low temperature difference of 7-8 degrees C lies within the range of 0.001-0.002. Repeatable and controllable multimodal initial conditions of up to 11 modes are generated using a flapper mechanism. Dependence of flow behavior on initial wavelength and phase angle are deduced by using sets of experimental cases. Integral mixing width, molecular mixing between the water streams and fine scale mixing of scalars are studied using Planar Laser Imaging Fluorescence, (PLIF) technique. Dependence of these variables on initial condition and their behavior at late times is studied. Anisotropy in the flow field is currently being studied using Particle Image Velocimetry.

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