Velocity, density and mixing growth rate measurements in Rayleigh-Taylor mixing layers with and without shear

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This paper presents the results from Rayleigh-Taylor instability experiments with shear conducted using the Gas Tunnel facility developed by Banerjee and Andrews (2006). Mixing growth rate constants calculated from high resolution digital image analysis are presented. Three wire Hot-wire-anemometry developed for this facility by Kraft *et al.* (2008) is used to measure the velocity and density statistics. The growth rates measured from image analysis are compared to the vertical velocity fluctuations measured at the centerline using hot wire anemometer. A cold wire anemometer is used to measure density fluctuations along with velocity. One of the fluid streams is heated 5^o above it's normal temperature and the temperature is measured using cold wire anemometer to identify the volume fraction of the heated fluid.

The experiments performed are of Atwood number ranging from 0.035 to 0.2 with and without shear. The simultaneous measurements of velocities and density are made at three points across and along the channel. The measured $\overline{\rho'^2}$, $\overline{\rho' u'}$, $\overline{\rho' v'}$ and Reynolds stress $\overline{u' v'}$ at these points and their effect on the turbulence mixing growth will be discussed during this presentation.

References

Banerjee, A. and Andrews, M., Statistically steady measurements of Rayleigh-Taylor mixing in a gas channel; *Phy. of Fluids* **18**, 035107 (2006).

Kraft, W.N., Banerjee, A. and Andrews, M.J., On hot-wire diagnostics in Rayleigh-Taylor mixing layers, *Exp. in Fluids* **47**, 49-68 (2009).