Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Qualitative and quantitative features of Rayleigh-Taylor mixing dynamics PRAVEEN RAMAPRABHU, VARAD KARKHANIS, University of North Carolina at Charlotte, ANDREW LAWRIE, University of Bristol, AKLANT BHOWMICK, SNEZHANA ABARZHI, Carnegie Mellon University, RTI COLLABORATION — We consider dynamics of Rayleigh-Taylor (RT) flow in a large aspect ratio three-dimensional domain with square symmetry in the plane for fluids with contrasting densities. In order to quantify the interface evolution from a small amplitude single-mode initial perturbation to advanced stage of RT mixing, we apply numerical simulations using the MOBILE code, theoretical analyses, including group theory and momentum model, as well as parameters describing the interplay between acceleration and turbulence. We find: In RT flow, the fluid motion is intense near the interface and is negligible far from the interface. At late times the growth rates of RT bubbles and spikes may increase without a corresponding increase of length-scales in the direction normal to acceleration. The parameters describing the interplay between acceleration and turbulence in RT mixing are shown to scale well with the flow Reynolds number and Froude number.

Praveen Ramaprabhu
University of North Carolina at Charlotte

Date submitted: 16 Jul 2015 Electronic form version 1.4