Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Local Wave Number Model for Inhomogeneous Turbulence[1]
NAIRITA PAL, SUSAN KURIEN, Los Alamos National Labortaory, ISMAEL BOUREIMA, PRAVEEN RAMAPRABHU, University of North Carolina, Charlotte, ANDREW LAWRIE, University of Bristol — We provide a systematic characterization of buoyancy-driven two-fluid system in the Rayleigh-Taylor configuration using a spectral turbulence model. In the system, we have a heavy fluid accelerated into a light fluid by grav- itational acceleration. In the spectral turbulence model, known as "Local Wave Numbe" or LWN model, we compute the time-evolution of the spectral distribution in wave number k of the correlation of density and specific volume $b(k)$, the velocity associated with the turbulent mass flux $a(k)$, and the turbulent kinetic energy $E(k)$, using a set of coupled equations. We next assess the accuracy of the model relative to Implicit Large Eddy Simulations of the same system using b, a and E as metrics. We show that the model is able to capture the gross features of the flow, like the evolution of the mixing layer and the evolution of the mean mass flux velocity with time. In particular the well-known quadratic growth of the mix layer is captured by the LWN model.

[1]ASC PEM (Mix and Burn), Los Alamos National Laboratory

Nairita Pal
Los Alamos National Labortaory

Date submitted: 31 Jul 2019 Electronic form version 1.4