Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Comparisons of a Reynolds-Averaged Navier–Stokes Model with Self-Similar Solutions for Large Atwood Number Rayleigh–Taylor Mixing[1] RHYS ULERICH, University of Texas at Austin, OLEG SCHILLING, Lawrence Livermore National Laboratory — A new high-order, multicomponent, weighted essentially nonoscillatory (WENO) implementation of a three- and four-equation Reynolds-averaged Navier-Stokes (RANS) model incorporating both mechanical and scalar turbulence is used to simulate intermediate-to-large Atwood number Rayleigh-Taylor turbulent mixing. The predicted RANS mixing layer evolution is compared with the analytical self-similar solutions of the transport equations. The terms in the transport equation budgets are compared in detail to their self-similar profiles across the mixing layer. Additionally, the sensitivity of the RANS solutions to variations in the initial conditions and in the model coefficients is explored. The implications of these results for advanced modeling of Rayleigh-Taylor turbulent mixing are discussed.

[1]This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344 and by the DOE National Nuclear Security Administration under Award Number DE-FC52-08NA286.

Oleg Schilling
Lawrence Livermore National Laboratory

Date submitted: 05 Aug 2010 Electronic form version 1.4