Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Investigation of Turbulence Dynamics in a Very Large Reynolds Number Rayleigh-Taylor Mixing Layer Using Direct Numerical Simulation Data[1] GREGORY BURTON, OLEG SCHILLING, Lawrence Livermore National Laboratory — Classical gradient-diffusion models of turbulent transport in Rayleigh-Taylor instability-induced mixing are assessed using data from the Cabot and Cook [Nat. Phys. **2**, 562] 3072^3 direct numerical simulation (DNS) attaining a Reynolds number of $\sim 32,000$. Mean and fluctuating fields, defined from spatial averages over the two periodic directions of the DNS, are used to construct the profiles across the mixing layer of the terms in the turbulent kinetic energy and turbulent kinetic energy dissipation rate transport equations. The unclosed terms are then compared a priori with the corresponding terms modeled using the gradient-diffusion approximation to assess the validity of this approximation at very large Reynolds numbers. In addition, optimized turbulent Schmidt numbers appearing in the closures are obtained by correlating the unclosed and closed model terms.

[1]This work was performed under the auspices of the U.S. Department of Energy by the University of California, Lawrence Livermore National Laboratory under Contract No. W-7405-Eng-48.

Oleg Schilling
Lawrence Livermore National Laboratory

Date submitted: 02 Aug 2007 Electronic form version 1.4