

Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Passive Scalar Mixing in Compressible Isotropic Turbulence¹

ADAM J. WACHTOR, FERNANDO F. GRINSTEIN, Los Alamos National Laboratory, C. RICHARD DEVORE, Naval Research Laboratory — Turbulent mixing of a passive scalar is studied through use of implicit large-eddy simulation (ILES) in the context of forced compressible, isotropic turbulence with a mean scalar gradient. The under-resolved prediction of mixing by an under-resolved turbulent velocity field is the problem that the ILES framework addresses without using any explicit model. Low wavenumber forcing is done separately for the solenoidal and dilatational components of the velocity in order for the flow field to achieve a statistically stationary state. The efficiency of ILES allows for the creation of large time-volume ensembles at relatively low computational cost. Effects of Mach number, grid resolution, and the forcing ratio of solenoidal to dilatational kinetic energy on the flow and subsequent scalar mixing will be presented.

¹Funded by LANL LDRD-ER on “LES Modeling for Predictive Simulations of Material Mixing.”

Adam J. Wachtor
Los Alamos National Laboratory

Date submitted: 13 Aug 2011

Electronic form version 1.4