ILES of Passive Scalar Mixing in Forced Isotropic Turbulence
ADAM WACHTOR, FERNANDO GRINSTEIN, Los Alamos National Laboratory, RICK DEVORE, Naval Research Laboratory, RAY RISTORCELLI, LEN MARGOLIN, Los Alamos National Laboratory — Predictability of scalar mixing by an under-resolved turbulent velocity field is investigated using ILES. Turbulent mixing of a passive scalar by forced, compressible, isotropic turbulence with a prescribed mean scalar gradient is studied. The simulation strategy uses a multi-dimensional FCT algorithm, with low wavenumber momentum forcing imposed separately for the solenoidal and dilatational velocity components. Effects of grid resolution on the flow and scalar mixing are investigated at turbulent Mach numbers 0.13 and 0.27. ILES captures the mixing transition as function of effective Reynolds number determined by grid resolution, including asymptotic behaviors and characteristic turbulent metrics.