Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Implicit LES of turbulent lid-driven cavity flows J.M. MCDONOUGH, Unversity of Kentucky — The lid-driven cavity (LDC) problem has long provided a canonical test of CFD codes, first in 2D and now in 3D. At least in part due to its importance in CFD (simple geometry and boundary conditions), it has also received considerable attention from experimentalists. Here, we employ this problem to demonstrate behavior of implicit LES (ILES) performed on very coarse computational grids (as few as 1000 grid cells) at Reynolds numbers near transition to turbulence, and higher. Both "standard" ILES and "enhanced" (via synthetic-velocity models) ILES results will be compared with those from laboratory experiments and with highly-resolved DNS for the basic LDC problem consisting of a cubical cavity with only one wall in constant motion. Of particular interest will be the ability, or lack thereof, of ILES to predict transition to turbulence at the appropriate Reynolds number, and the extent to which turbulent flow calculations match results observed in experiments as numerical discretizations are refined. It will be shown that synthetic-velocity enhanced ILES provides improved predictions over standard versions even for very simple synthetic-velocity models.

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Date submitted: 03 Aug 2011 Electronic form version 1.4