

Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

LES of Turbulent Channel Flow at Large Re_τ ¹ DANIEL CHUNG, DALE PULLIN, California Institute of Technology — Large-eddy simulation (LES) of turbulent channel flow will be discussed. A special near-wall, subgrid-scale (SGS) model is developed based on wall-normal averaging of the streamwise momentum equation and local inner scaling combined with an extended form of the stretched-vortex, subgrid-scale (SGS) model. The latter incorporates production of Reynolds shear stress produced by the winding of streamwise momentum by near-wall, attached, SGS vortices. This then allows calculation of an instantaneous slip velocity that is then used as a “virtual-wall” boundary condition for the LES within the log region. A Kármán-like constant is calculated dynamically as part of the LES. With this closure, LES of turbulent channel flow will be presented for Re_τ in the range $2 \times 10^3 - 2 \times 10^7$.

¹Supported by the NSF.

Dale Pullin
California Institute of Technology

Date submitted: 06 Aug 2008

Electronic form version 1.4