Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Application of the High Gradient hydrodynamics code to simulations of a two-dimensional zero-pressure-gradient turbulent boundary layer over a flat plate[1] BRYAN E. KAISER, SVETLANA V. POROSEVA, University of New Mexico, JESSE M. CANFIELD, JEREMY A. SAUER, Geophysical Fluid Dynamics Institute, Florida State University, RODMAN R. LINN, Los Alamos National Laboratory — The High Gradient hydrodynamics (HIGRAD) code is an atmospheric computational fluid dynamics code created by Los Alamos National Laboratory to accurately represent flows characterized by sharp gradients in velocity, concentration, and temperature. HIGRAD uses a fully compressible finite-volume formulation for explicit Large Eddy Simulation (LES) and features an advection scheme that is second-order accurate in time and space. In the current study, boundary conditions implemented in HIGRAD are varied to find those that better reproduce the reduced physics of a flat plate boundary layer to compare with complex physics of the atmospheric boundary layer. Numerical predictions are compared with available DNS, experimental, and LES data obtained by other researchers. High-order turbulence statistics are collected. The Reynolds number based on the free-stream velocity and the momentum thickness is 120 at the inflow and the Mach number for the flow is 0.2. Results are compared at Reynolds numbers of 670 and 1410.

[1]A part of the material is based upon work supported by NASA under award NNX12AJ61A and by the Junior Faculty UNM-LANL Collaborative Research Grant.

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Date submitted: 01 Aug 2013 Electronic form version 1.4