Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Filter and Grid Resolution in DG-LES LING MIAO, Department of Mechanical Engineering and Materials Science, University of Pittsburgh, SHERVIN SAMMAK, Center for Research Computing, University of Pittsburgh, CYRUS K. MADNIA, Department of Mechanical and Aerospace Engineering, State University of New York at Buffalo, PEYMAN GIVI, Department of Mechanical Engineering and Materials Science, University of Pittsburgh — The discontinuous Galerkin (DG) methodology has proven very effective for large eddy simulation (LES) of turbulent flows. Two important parameters in DG-LES are the grid resolution (h) and the filter size (Δ). In most previous work, the filter size is usually set to be proportional to the grid spacing. In this work, the DG method is combined with a subgrid scale (SGS) closure which is equivalent to that of the filtered density function (FDF). The resulting hybrid scheme is particularly attractive because a larger portion of the resolved energy is captured as the order of spectral approximation increases. Different cases for LES of a three-dimensional temporally developing mixing layer are appraised and a systematic parametric study is conducted to investigate the effects of grid resolution, the filter width size, and the order of spectral discretization. Comparative assessments are also made via the use of high resolution direct numerical simulation (DNS) data.

Ling Miao
University of Pittsburgh

Date submitted: 31 Jul 2017 Electronic form version 1.4