Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

High order DG discretizations with p-adaptive limiting for high speed flows on mixed type meshes JOHN EKATERINARIS, KONSTANDINOS KONTZIALIS, School of Mechanical and Aerospace Eng., University of Patras, Gereece — High order accurate discontinuous Galerkin (DG) discretizations are applied for mixed-type meshes in two and three dimensions. Collapsed coordinate transformations are used and all calculations of DG discretizations for arbitrary mixed-type meshes are performed in the canonical computational space. High order accurate implicit time marching is used for time advancement. For computations of high speed flows with strong discontinuities, a new limiting approach that is applied in the canonical computational domain and it is suitable for arbitrary-type meshes, is employed. Limiting is applied with a modified total variation bounded (TVB) limiter, previously used for DG discretizations in quadrilateral meshes. Accurate evaluation of the variation of the second derivative of the approximate solution allows to accurately detect regions of discontinuities where limiting must be applied and progressively increase the accuracy of the computed solution away from discontinuities. For the computation of flows with large pressure and density ratios, positivity preserving limiters are used to ensure that density and pressure remain well defined. Application of the new limiting approach and positivity preserving limiters to a number of standard test cases of high speed flows with discontinuities is carried out to demonstrate the versatility and robustness of the proposed method.

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Date submitted: 12 Aug 2011 Electronic form version 1.4