Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Explicit filtering based LES of turbulent combustion COLIN HEYE, The University of Texas at Austin, COLLEEN M. KAUL, The University of Texas at Austin; Center for Turbulence Research, Stanford University, VENKAT RAMAN, The University of Texas at Austin — Large eddy simulation (LES) of turbulent combustion relies on accurate characterization of small-scale scalar dissipation rate and scalar variance. Subfilter models for these quantities are based on filter-scale gradients. In practical LES computations, the implicit filtering approach inextricably links the filter width to the computational mesh. Since numerical errors are highest at scales comparable to the mesh size, numerical errors severely contaminate the evaluation of important subfilter quantities. Here, an explicit filtering approach is developed for conserved scalar-based combustion applications, which allows the mesh to be varied independently of the filter size. Using both homogeneous and jet-type flows, the practical issues in such implementations are examined. In particular, the need for non-invertible filtering techniques is discussed.

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Date submitted: 15 Aug 2011 Electronic form version 1.4