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A GPU Accelerated DG-FDF Simulator for Large Eddy Simulation of Reacting Turbulent Flows[1] MEDET INKARBEKOV, AIDYN AITZHAN, ASET KOLDAS, AIDARKHAN KALTAYEV, Al-Faraby Kazakh National University, PEYMAN GIVI, University of Pittsburgh — A GPU accelerated simulator is developed and implemented for large eddy simulation (LES) of reacting turbulent flows. In this simulator, the problem of the unresolved scalar fluctuations is solved by applying the filtered density function (FDF) methodology. The advantage of the methodology is that the effect of chemical reactions appears in a closed form. The base filtered transport equations are solved numerically by a Discontinuous Galerkin (DG) method, while the FDF transport equation is solved by a particle based Lagrangian Monte-Carlo (MC) method. A very important advantage of DG method is that it can provide high order accuracy with fewer degrees of freedom. Because of the compact formulations of the hybrid DG-MC scheme, it is very well suited for parallelization on general purpose GPUs. The performance of the code is compared against a standard serial code and it is shown to give as much as ˜20 times acceleration on GeForce GTX Titan Black.

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