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Hybrid Eulerian-Lagrangian Vortex Model for Turbulent Reacting Flows JOHN ROYERO, KAREEM AHMED, University of Central Florida — A hybrid Eulerian-Lagrangian model for three dimensional large eddy simulations of turbulent reacting flows is presented. The method utilizes a Eulerian grid to resolve large scale flow features and the Lagrangian vortex element method to capture smaller subgrid scale effects and carry out reactions which are then communicated back to the Eulerian grid after a set number of Lagrangian time steps. Lagrangian influences are localized in order to reduce computational cost. The Lagrangian vortex method which utilizes the Helmholtz decomposition of the velocity into potential, expansive, and solenoidal components allows the separation of the various mechanisms contributing to vorticity including gas expansion, diffusion, external body forces and baroclinic torque and is coupled with the Eulerian solver allowing easier implementation in arbitrary reacting flows at a reduced computational cost compared to a pure Lagrangian solver.

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