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Effect of Mixing Model on Flame Extinction and Reignition using Large Eddy Simulation/Filtered Mass Density Function Approach
ABHILASH CHANDY, DAVID GLAZE, STEVEN FRANKEL, School of Mechanical Engineering, Purdue University, West Lafayette, IN - 47906 — The effect of using three different subgrid mixing models on the dynamics of flame extinction and reignition is studying using a hybrid Large Eddy Simulation (LES) and Filtered Mass Density Function (FMDF) approach. An idealized, piloted non-premixed jet flame with a one-step exothermic reaction $A + B \rightarrow P$ is studied with chemical kinetics parameters chosen to result in local extinction and reignition for the given Reynolds number. The mixing models to be studied include the Interaction by Exchange with the Mean (IEM), the Modified Curl (MC) and the Euclidean Minimum Spanning Tree (EMST). The relative performance of the mixing models is considered regarding extinction/reignition dynamics through examination of instantaneous flame images and scatter plots, as well as relevant statistical measures. Preliminary results towards efficient simulations of Sandia Flame D obtained using the above approach with realistic chemistry and the in situ adaptive tabulation or ISAT approach will be presented.

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