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Localized flame extinction and re-ignition in turbulent jet ignition assisted combustion ABDOULAHAD VALIDI, HAROLD SCHOCK, FARHAD JABERI, Michigan State University, COMPUTATIONAL FLUID DYNAMICS LABORATORY TEAM — Direct numerical simulations (DNS) of turbulent jet ignition (TJI)-assisted combustion of ultra-lean fuel-air is performed in a three-dimensional planar jet configuration. TJI is a novel ignition enhancement method which facilitates the combustion of lean and ultra-lean mixtures by rapidly exposing them to high temperature combustion products. Fully compressible gas dynamics and species equations are solved with high order finite difference methods. The hydrogen-air reaction is simulated with a detailed chemical kinetics mechanism consisting of 9 species and 38 elementary reactions. The interesting phenomena involved in TJI combustion including localized premixed flame extinction/re-ignition and simultaneous premixed/non-premixed flames are investigated by using the flame heat release, temperature, species concentrations, and a newly defined TJI progress variable.

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