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Structure of a laminar triple flame of a jet fuel surrogate KRITHIKA NARAYANASWAMY, PERRINE PEPIOT, Cornell University — Triple flames are found in jet flames and play an important role in the stabilization and thereby lift-off height of lifted jet flames. In this study, 2D laminar triple flames burning jet fuel are simulated using finite rate chemistry and detailed transport of species. The jet fuel is represented by using a surrogate mixture, comprised of n-dodecane, methyl-cyclohexane, and m-xylene. The chemical kinetics of this multi-component surrogate are described using a reduced model derived from a well-validated detailed mechanism. The structure of the simulated triple flames is explored by examining the reactivity of the different hydrocarbons in the multi-component fuel and the radical profiles. The heat release profiles of the lean and rich branches of the triple flame are compared to their unstretched 1D counterparts to identify similarities. Varying the composition of the components in the multi-component surrogate is found to result in little differences in the laminar flame speed predictions. The simulations are repeated for different fuel mixtures in order to investigate the effect of the surrogate fuel composition on the combustion process.

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