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Analysis of lift-off height and structure of n-heptane tribrachial flames in laminar jet configuration STEFANO LUCA, FABRIZIO BISETTI, Clean Combustion Research Center, KAUST — A set of lifted tribrachial n-heptane flames in a laminar jet configuration is simulated. The simulations are performed using finite rate chemistry and detailed transport, and aim at investigating the geometry and the structure of tribrachial flames. Varying the inlet velocity of the fuel, different stabilization heights are obtained, and the dependence on the inlet velocity is compared with experimental data. The results of the simulations show that when the stabilization height decreases, resulting in larger velocity and mixture fraction gradients at the tribrachial point, the tilt of the flame increases, while the heat release rate and radius of curvature decrease. A detailed analysis of the flame geometry, compared to unstretched premixed flames is performed, focusing on differential diffusion effects, flame stretch, and transport of heat and mass from the burnt gases to the flame front. Our analysis seems to indicate that for a flame that stabilizes further downstream positive stretch along the rich premixed wing leads to an increase in the rate of chemical reaction in the whole flame.

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