Experimental study on propane jet fires: 2. Comparison on geometrical features between experiments and empirical models

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Abstract
An experimental study of jet fires using propane was performed at the Brayton Fire Training Field (BFTF), College Station, to understand the flame geometry of jet fires. Horizontal jet fires were simulated by varying the mass flow rate of fuel through a 19 mm nozzle. The exit velocities varied from 25-210 m/s, flame lengths from 1-6 m and Froude Numbers from 4,000 to $2.3 \times 10^5$. The flames generated were visually captured using a normal CCD camera. The frames obtained from CCD camera are reconstructed using image visualization method to obtain the flame lengths and lift-off lengths. The flame lengths and lift-off lengths obtained from the image analysis were compared with empirical models. The flame length showed strong dependence on the Froude number indicating buoyancy-dominated regime. The lift-off length varied linearly with the strain rate.

Keywords: Horizontal Jet fire, LPG, flame length, lift-off length