

Effect of Sharp Corners' Nozzles on Inverse Jet Diffusion Flames

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Abstract

Reactants mixing has great effect on the combustion efficiency, the use of sharp corners in nozzles is recently investigated as an approach to obtain better mixing conditions for inverse jet diffusion flames and to generate a fully developed flame having low unburned hydrocarbons. The present work examines the effect of using nozzles with sharp corners on inverse jet diffusion flames experimentally. This research has been held for reacting flow, using nine different sharp corners nozzles with an approximate equivalent diameter of 12.38 mm. Circular nozzle is adopted as a reference value for comparison. The experiments were held at a constant air to fuel ratio of 50.30. The obtained results showed that increasing the number of sharp corners led to an increase of 38.54 % in the temperature fluctuations. Consequently, there was a reduction of 13.78 % in the peak temperature using the cross nozzle and an increase of 30% for the octagon nozzle. The triangular nozzle showed an effective enhancement in the fuel to air mixing rates such that the flame length was shortened by 50 %.

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