## Experimental and Numerical Study of Oxygen Enrichment on Methane Diffusion Flame in a Triple Port Burner

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## Abstract

Oxy-enriched combustion technology is one of cost-effective approaches to improve the flame stability and combustion efficiency. In general, a triple port burner can provide a simple diffusion flame to investigate the oxygen enrichment effect on the flame characteristics. In this study, the flame shape would shift from normal diffusion flame (NDF) to inverse diffusion flame (IDF) accompanying with changing flame color when the oxygen concentration in oxidizer is increasing. The operational range of IDF with various velocity ratios and oxygen enrichments is demonstrated. It appears that length of IDF becomes shorter as oxygen enrichment is increasing. Besides, numerical simulation for two cases ( $\Omega$ =40% and 60%) is also performed and indicates the significant increase of carbon monoxide concentration in IDF. It is argued that increasing oxygen in IDF would improve the oxidation reaction of soot and lead to abundant carbon monoxide production.

Keywords: oxy-enriched, inverse diffusion flame, triple port burner.