添加強氧化劑對甲烷噴流擴散火焰燃燒特性之影響

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摘要

In order to avoid the combustion instability during lean operation for lower fuel consumption, the strong oxidizer concept, such as employing oxy-enriched conditions, nitrous oxide (N2O) or hydrogen peroxide (H2O2) to enhance combustion and control the flame configurations, is proposed in this study. The objective of this work is to theoretically and experimentally investigate the flame behaviors of strong oxidizer addition to methane diffusion flames by varying the ratio of oxidizer jet velocity to that of the fuel jet (R=V1/V2), carried out on a three port co-annular burner.The theoreticalresults show that the stream velocities, fuel and oxidizerconcentrations and stream temperatures are important parameters for flame structures. The experiment results reveal that formation of the particular double flame structure: an inner inverse diffusion flame (IDF) and an outer normal diffusion flame (NDF) can be observed only by using N2O or H2O2as an oxidizer and oxy-enriched conditions of Ω40%. It is conjectured that by increasing the oxygen content the local heat release rate rises to a critical condition so that the induced partially premixed flame propagates rapidly upstream to form the inner IDF and, the outer NDF flame height will suddenly increase in the meanwhile. In addition, itis found that when N2O is used as the oxidizer operating condition of the R value of IDF are quite similar to that for Ω=70%. Results also suggest that free radicals and large heat release from N2O dissociation enhance the intensity and stabilization of the combustion system.

關鍵字：Multi-port burner, Oxy-enriched combustion, Nitrous oxide, Hydrogen peroxide