On the Evaporation and Ignition of Kerosene Fuel Droplet

Qasim Sarwar Khan, Seung Wook Baek and Hojat Ghassemi

케로신 연료 액적의 증발과 점화 현상에 관한 연구

카심 살월 칸† · 백승욱* · 호잿 가세미** (한국과학기술원)

Key Words: Kerosene(케로신), evaporation(증발), ignition(점화)

Abstract : In the current study, the vaporization and ignition of kerosene were experimentally investigated at high temperatures (between 400 and 800 °C) and high pressures (between 0.1 and 2.0 MPa) under normal gravity. Experiments were done on a freely suspended isolated droplet at the tip of a quartz fiber. The evaporation, ignition and burning processes were recorded by a high speed camera and hence the vaporization rate and ignition delay times were calculated. Despite its multicomponent nature, the evaporation of kerosene droplet followed the d^2-law after initial heating up period. While the ignition delay times were found to be diminishing as the ambient pressure approaches critical value.

스월을 강화한 부분예혼합 화염의 유동특성과 상세 라디칼(OH*, CH*, 그리고 C2*) 정보에 관한 실험적 연구

안경민†(부산대) · 정용기*(부산대) · 전충환**(부산대) · 장영준**(부산대)

Detailed Local Chemiluminescence Measurement (OH^*, CH^*, and C_2^*) and Flow Characteristic in Partially Premixed CH_4/Air Swirling Flame

Kyoung Min Ahn, Yong Ki Jeong, Chung Hwan Jeon and Young June Chang

Key Words: Partially premixed flame (부분예혼합화염), Chemiluminescence (자발광), Flow Characteristic (유동특성), Schlieren (슈리렌)

Abstract : An experimental study was performed to investigate the effects of partially premixing, varying the equivalence ratios from 1.36~∞, and swirlers with swirl numbers of 0, 0.28, 0.64, and 1.32, on flow characteristic and chemiluminescence of OH, CH, and C_2 in partially premixed swirling flames. The signal from the electronically excited state of OH^*, CH^*, and C_2^* was detected through a band pass filter with a photo multiplier tube, and flow fields images were detected through a schlieren system. The results demonstrated that the flame height decreases and jet spreading angle increase with increasing a swirl number. The more momentum ratio and swirl number increase, the more decrease flame height, and the generation of sooting flame is promoted.