난류확산화염에서의 라디칼 자발광 계측에 관한 연구

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A Study on the Radical Emission measurement in Turbulent Diffusion Flame

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Key Words : Flame Chemiluminescence(화염 화학 발광), Turbulent Flame(난류화염), NOx(질소산화물), Equivalence Ratio(당량비)

Abstract : This work focuses on the use of flame chemiluminescence for sensing applications in monitoring of a turbulent flame. The optical emissions from a turbulent swirl gas flame were investigated using Photomultipliertube(PMT) and spectrometer system. The goal of this research is to analyse the relationship between flame chemiluminescence intensity and burner operating conditions. The chemiluminescent emissions of OH^*, CH^*, and C_2^* were measured at various equivalence ratios and thermal inputs. The effects of equivalence ratios and NOx emission characteristics on the radical emission intensities (CH^*/OH^*, C_2^*/CH^*, C_2^*/OH^*) were investigated experimentally.

로켓엔진 연소기에서 유한화학반응을 채택한 연소장 계산과 연소 불안정성 예측에의 적용

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Calculation of Reactive Flow Field with Finite-Rate Chemistry and Its Application to Combustion-Instability Prediction in LRE

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Key Words: Reactive Flow Field(반응유동장), Finite-Rate Chemistry(유한화학반응), Combustion Instability(연소 불안정), LRE(액체 로켓엔진)

Abstract : Reactive flow fields in a sample combustor of a liquid-propellant rocket engine are investigated numerically with propellant combination of kerosene and liquid oxygen for design and off-design operating conditions. The effects of the multi-dimensional chamber and finite-rate chemistry are emphasized. From the numerical results, the multi-dimensional effect of the chamber on temperature field has negligible, but the finite-rate chemistry delays appreciably the establishment of combustion zone, leading to lower temperature field. These quasi-steady results are applied to combustion-instability prediction based on the results of acoustic pressure responses from the previous works adopting laminar flamelet model. The stability predictions are in a good agreement with the previous numerical results adopting transient analysis.