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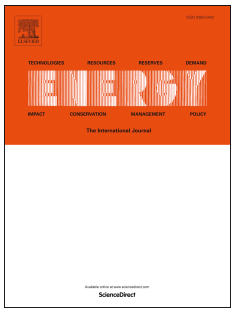

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Experimental Study on the Effects of Mixture Flow Rate, Equivalence Ratio, Oxygen Enhancement, and Geometrical Parameters on Propane-Air Premixed Flame Dynamics in Non-Adiabatic Meso-scale Reactors

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Abstract

In the present study, the effects of reactive mixture flow rate, adding oxygen to propane-air mixture, geometrical parameters, and equivalence ratio on propane-air/oxygen premixed flame dynamics in non-adiabatic meso-scale reactors were experimentally investigated. During the experiments, seven flame regimes of blow-off, blow-out, asymmetric stationary, stationary-repetitive extinction and re-ignition (RERI), forced/self-RERI, RERI-flash-back, and flash-back were observed. The results showed that increasing the reactive mixture flow rate could generally promote variety of the flame regimes and also improve flame stability in the non-adiabatic meso-scale reactors, especially in 40% and 80% oxygen-enhanced cases. Also, the results demonstrated that increasing the reactor inner diameter and equivalence ratio generally extended propane-air- oxygen flame stability and its presence range in the