

Investigations of Flowfield and Flame Structures in Recirculation Zone of
Swirling Methane Jet Flames
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Abstract

In the present study, the flowfield and flame structures in recirculation zone of swirling methane/air flames ($S = 1.0$, $MR = 1.5$ and 0.14) with axial fuel injection are investigated. LDV is used to determine the fluid dynamic properties of the flowfields. UV Raman scattering and laser-induced predissociative fluorescence (LIPF) techniques are combined to simultaneously measure temperature, mixture fraction, major species (CO_2 , O_2 , CO , N_2 , CH_4 , H_2O , and H_2), and OH radical concentrations in the flames. Previously, velocity measurements in the flame with $MR = 0.14$ were made at further downstream locations from the burner exit to study effects of fuelair mixing on flame structures and pollutant emissions [4]. LDV measurements are re-performed at location near the burner exit where the measured data can be used as initial boundary conditions for numerical simulations.

Keyword : Swirling jet flames; LDV; Raman measurements