

Temperature Field Measurement of Premixed Landfill Gas Laminar Flame in a Cylindrical Slot Burner Using Mach-Zehnder Interferometry

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Abstract : The temperature field is a key factor of flame heat transfer rate and therefore should be measured accurately. In this study, the Mach-Zehnder Interferometry method is applied to measure the temperature field of premixed air/landfill gas (LFG60:60% CH₄+40% CO₂) laminar flame. The three-dimensional flame of cylindrical slot burner can assume to be two-dimensional due to the high aspect ratio (L/W=10) of the rectangular slot. So, the method converts two-dimensional flame to closed isothermal curves called fringes and the outer fringes temperature is measured by thermocouples. The experiments are carried out for Reynolds numbers and equivalence ratios ranging from 100 to 400 and 1.0 to 1.4, respectively. Results show that by increasing the equivalence ratio or Reynolds number, the flame height increases. The maximum flame temperature decreases by increasing the equivalence ratio but does not change considerably by changing the Reynolds number.

Keywords : landfill gas, Mach-Zehnder interferometry, premix flame, slot burner, temperature field

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