

Simultaneous measurements of local equivalence ratio and temperature in
CH₄-air flames using chemiluminescence sensor

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Abstract

The objective of this research is to develop a low cost, non-laser based optical sensor for simultaneous measurements of local equivalence ratio and temperature in turbulent premixed hydrocarbon flames. The measurement system consists of a Cassegrain optics coupled with an optical fiber and a monochromator. The developed optical sensor is calibrated in laminar premixed CH₄-air Bunsen flames operated at several equivalence ratios ranging from 0.85 to 1.5. The applicability of the sensor is demonstrated in stoichiometric and rich turbulent premixed flames. Experimental results indicate that the chemiluminescence sensor can simultaneously measure the local equivalence ratio and temperature in turbulent premixed hydrocarbon flames with satisfactory accuracy.

Keyword : Chemiluminescence Sensor; Local equivalence; Temperature