HEAT RADIATION LOSSES FROM PROPAGATING SPHERICAL FLAMES OF MIXTURES WITH METHANE, HYDROGEN, CARBON MONOXIDE AND AIR.

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The propagating spherical flame or spherical expanding flame (SEF) method is specified for many authors as the most convenient to determine the laminar flame speed and the Markstein length[1]. However, this method presents many shortcomings [2], such as spark ignition, confinement, radiation losses, compression effects of unburned gases and products, among others. In this study, the radiation-induced uncertainty is under analysis using numerical and experimental data. Currently in the literature, the radiation effect on the flame speed determination was studied numerically. This is the first time that experimental data is exploited to quantify the level of radiation losses. A spherical bomb with a window diameter of 100mm is used, the classical configuration in Z for schlieren is used for record of the flame diameter during its expansion, and a designed IR-based transductor was adapted to measure radiation losses. Mixtures of methane (CH_4), carbon monoxide (CO), and hydrogen (H_2) in air at different equivalence ratios (0.8; 1.0 and 1.2) and different initial temperatures and pressures were considered.

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References

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