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Laser-induced breakdown spectroscopy for measurement of fuel/oxygen mixing in combustion MATTHEW DACKMAN, J.W.L. LEWIS, YING-LING CHEN, LEI SHI, University of Tennessee Space Institute — Laser-induced breakdown spectroscopy (LIBS) is applied for measurement of C-O equivalence ratios and mixing in a methane/oxygen flame. A nominal 10-nanosecond Q-switched Nd:YAG laser is used to effect a cascade-type optical breakdown in the flame, which is projected above a pre-mixed McKenna burner. Atomic and ionic carbon and oxygen spectra are used to verify the combustion equivalence ratios in the range of 0.5 to 2.0. Emission spectra are obtained separately from the near ultraviolet (vicinity of 250nm) and from the visible (vicinity of 430nm) using gated array detectors. Emission data are obtained over a range of sub-microsecond delay times following the laser pulse. The ultraviolet lines exhibit significantly larger signal-to-noise/background ratios, but the visible lines possess greater relative intensity. Implications of these results are discussed for local measurements of fuel-oxidizer ratios for both atmospheric pressure and high pressure combustion.

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