LASER ABSORPTION SPECTROSCOPY OF HYDROCARBON FLAMES

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Intracavity Laser Absorption Spectroscopy (ICLAS) and Cavity Ring-Down Spectroscopy (CRDS) were used to detect absorption spectra of CH($C^2\Sigma^+ \leftarrow X^2\Pi$) at 314 nm, $^1CH_2$ ($\tilde{b}^1B_1 \leftarrow \tilde{a}^1A_1$) at 590 and 620 nm, NH ($A^3\Pi_i \leftarrow X^3\Sigma^-$) at 336 nm , and NH_2 ($\tilde{A}^2A_1 \leftarrow \tilde{X}^2B_1$) at 598 nm in a low-pressure (30 Torr) stoichiometric methane/oxygen/nitrogen flat flame doped with a small amount of nitrous oxide . The CH and NH radicals were monitored by CRDS whereas $^1CH_2$ and NH_2 were monitored by ICLAS. The absolute concentration profiles of those radicals were measured. The radical absorption spectra were recorded with good signal-to-noise ratio. The spectra of the $^1CH_2$ radical were measured in different spectral ranges that allowed us better determination of its absorption cross section. For the first time the absolute concentrations of NH and NH_2 were measured in the flames of this kind. The agreement between experimental results and model predictions based on the GRI-Mech 2.11 mechanism is discussed.