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Gas temperature measurements using wavelength modulation spectroscopy at 1.39 μm

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Keywords

combustion, gas temperature measurements, wavelength modulation spectroscopy, water vapor

Abstract

Gas temperature measurements in a combustion system by using wavelength modulation spectroscopy $2f$ ratio of two selected transitions method were presented for 1.39 μm . Wavelength modulation was performed at 35 kHz, and was superimposed on 500 Hz wavelength scans in order to recover full second-harmonic line shapes. H_2O line-pair at 7164.901 cm^{-1} and 7165.215 cm^{-1} was selected for this measurement. The criteria of the line-pair selection were discussed. The sensitivity and accuracy of the sensor were demonstrated in a static cell in laboratory (over the temperature range of 400-1000 K, average bias $\sigma_T \sim 5$ K). Burner experiments demonstrate the ability of our system for *in situ* measurements. The influence caused by variation of total pressure and species concentration in burning gas during combustion was also discussed.



380.5 kB

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