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Fast mid-infrared spectroscopy of gases: measurement method during a H_2/O_2 deflagration[1] MARIE DABOS, CEA-GRAMAT, KHANH-HUNG TRAN, LEME, Paris Nanterre University, NICOLAS LECYSYN , GERARD BAUDIN, MARC GENETIER, CEA-GRAMAT, ISABELLE RANC, BRUNO SERIO, LEME, Paris Nanterre University — To study detonation products of condensed matter containing aluminum particles in the post-combustion phase, a preliminary work is carried on deflagrations. The study of molecules' radiative properties during this fast phenomenon is not simple in the MWIR range. The flame front of H_2/O_2 gas mixtures spreads in a few tens of meters per second, a fast IR detection system is required. Besides, there are no standard source in that spectral range for the intensity and spectral position calibration. The important feature of the experimental set-up presented is the record of high-resolution spectra dynamically at high speed, up to 10 kHz. The set-up is composed of a cylindrical combustion chamber with optical accesses. The pressure evolution is measured by a high speed piezoelectric sensor. The ignition is synchronized with the camera trigger. The radiation is focused into a monochromator and at its exit slot a camera records in real time the spectra. The spectral intensity is calibrated using a blackbody. The correspondence between the spatial position of a pixel and the wavelength is fitted using an original method based on the application of a third degree polynomial taking into account optical aberrations. The method is presented with the example of a $H_2/O_2/N_2/CO_2$ gaseous deflagration. The resulting spectra can be used to determine the temperature and the emissivity of gases.

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