LINE PARAMETERS OF WATER VAPOUR IN THE NEAR-AND MID-INFRARED REGIONS DETERMINED USING TUNEABLE LASER SPECTROSCOPY

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The absorption coefficients of water vapour are of crucial importance for atmospheric radiative transfer, infrared remote sensing and combustion diagnostics. Although this molecule (number one in the HITRAN database) has been studied for many decades, there still exist significant discrepancies between different experiments concerning the absolute line intensities in the near-infrared region[1-4].
In this work we propose an intercomparison of the absorption coefficients of water vapour in the near-infrared (11900-12300 cm^{-1}) and mid-infrared (2600-2900 cm^{-1}) regions. The experimental set-up consists of a tuneable external-cavity diode laser (ECDL) and of a tuneable (1800-3050 cm^{-1}) cw infrared laser based on difference-frequency generation in a periodically-poled lithium niobate (PPLN) crystal, using the ECDL and a cw diode-pumped Nd:YAG laser. The combination of these two lasers guarantees that the H_2O spectra are recorded in both regions simultaneously under exactly the same experimental conditions.
Lines strengths, self- and air-induced pressure-broadening coefficients were measured for several lines in both the near- and mid-infrared regions. Collisional narrowing effects were observed and modelled by a Galatry profile. Our spectroscopic line parameters are compared with the results from previous studies[1-4].

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