SELF-BROADENING COEFFICIENTS FOR FUNDAMENTAL AND HOT BANDS OF ACETYLENE IN THE 1300 CM^{-1} REGION

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Acetylene is one of the most common hydrocarbons present in Eath's atmosphere[1] which origiantes mainly from human activities[2], but also from natural phenomena[3]. Because of its presence in combustion processes, it can be used as marker for antropogenic pollution monitoring. C_2H_2 was also detected in planetary atmospheres inside and outside our solar system, as well as in interstellar medium (see review in Ref[4]). The computation of transfer radiative models and opacities requires accurate spectroscopic data. In particular, the line shape parameters are the least well known.

In this study, the self-broadening coefficients were determined for acetylene lines in the 1300 cm^{-1} spectral region. The measurements were performed at room temperature using a high-resolution mid-infrared dual comb spectrometer based on quantum cascade lasers, that is well suited for line shape parameter measurements[5]. Thanks to a specifically designed absorption cell, transitions in the $\nu_4 + \nu_5$ fundamental and two hot bands were studied. The obtained results exhibit the expected smooth variation with respect to the rotational quantum number J. To the best of our knowledge, it is the first time that the self-broadening coefficients were directly determined for the two studied hot bands. The results for the fundamental band are in good agreement with literature.

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