SELF- AND AIR-BROADENED LINE SHAPE PARAMETERS OF $^{12}CH_4$: 4500-4620 CM^{-1}

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Accurate knowledge of spectral line shape parameters is important for infrared transmission and radiance calculations in the terrestrial atmosphere. We report the self- and air-broadened Lorentz widths, shifts and line mixing coefficients along with their temperature dependences for methane absorption lines in the 2.2 μm spectral region. For this, we obtained a series of high-resolution, high S/N spectra of 99.99% ^{12}C-enriched samples of pure methane and its dilute mixtures in dry air at cold temperatures down to 150 K using the Bruker IFS 125HR Fourier transform spectrometer at JPL. The coolable absorption cell had an optical path of 20.38 cm and was specially built to reside inside the sample compartment of the Bruker FTS[a]. The 13 spectra used in the analysis consisted of seven pure $^{12}CH_4$ spectra at pressures from 4.5 to 169 Torr and six air-broadened spectra with total sample pressures of 113-300 Torr and methane volume mixing ratios between 4 and 9.7%. These 13 spectra were fit simultaneously using the multispectrum least-squares fitting technique[b]. The results will be compared to existing values reported in the literature.[c]

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[a] K. Sung, A. W. Mantz, L. R. Brown, *et al.*, *J. Mol. Spectrosc.* **162** (2010) 124-134.

[b] D. C. Benner, C. P. Rinsland, V. Malathy Devi, M. A. H. Smith and D. Atkins, *JQSRT* **53** (1995) 705-721.

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