AIR-BROADENING COEFFICIENTS AND PRESSURE SHIFT COEFFICIENTS OF $^{12}CH_3D$ LINES IN THE 7.7 TO 10 μm SPECTRAL REGION

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High quality and precise measurements of air-broadening and air-shift coefficients, relative intensities and accurate line positions have been measured for $^{12}CH_3D$ lines between 1000 and 1300 cm^{-1}. The results were derived from analysis of eleven 0.005-cm^{-1} resolution laboratory absorption spectra recorded with the McMath-Pierce Fourier transform spectrometer at the National Solar Observatory on Kitt Peak, Arizona. The data were obtained using a high purity (99 percent) isotopic sample of $^{12}CH_3D$ and two absorption cells with path lengths of 25 and 150 cm, respectively. Three low-pressure spectra with $^{12}CH_3D$ ranging in pressures from 1 to 3 Torr and eight broadened spectra of dilute mixtures of $^{12}CH_3D$ in air with total pressures varying between 100 and 400 Torr were used to determine the broadening and shift coefficients. The calibration of the wavelength scale of each spectrum was performed relative to the positions of the ν_2 band water vapor lines published by Toth.[a] A multispectrum nonlinear least-squares spectral fitting technique[b] was used. The results are compared with previous measurements and calculations.

[a] R. A. Toth, J. Opt. Soc. Am. B **8**, 2236-2255 (1991).
[b] D. C. Benner, C. P. Rinsland, V. Malathy Devi, M. A. H. Smith and D. Atkins, JQSRT **53**, 705-721 (1995).