

SATURATION-DIP MEASUREMENTS IN THE ν_8 C-O STRETCHING FUNDAMENTAL BAND OF METHANOL WITH A DUAL-MODE CO₂-LASER/MICROWAVE-SIDEBAND SPECTROMETER

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We have extended the sub-Doppler spectroscopic study of the ν_8 C-O stretching fundamental band of methanol with a dual-mode CO₂-laser/microwave-sideband spectrometer^a. A further 492 transitions, including a number of overlapped and doublet lines unresolved in the Doppler-limited spectra of the broadband scanning mode, have been observed as saturation dips with a resolution of 0.4 MHz in the sub-Doppler detection mode and their frequencies have been measured with accuracy of order ± 200 kHz. For K from 1 to 5, energy term values for the excited-state levels of these A - and E -species transitions have been determined using known ground-state energies and have been fitted to Taylor-series expansions in powers of $J(J+1)$ to yield accurate expansion coefficients. The present, together with previous sub-Doppler measurements^{a,b}, provide a high accuracy database for CH₃OH, with application to methanol vibrational interaction studies and the interpretation of the optically pumped far-infrared laser emission spectrum.

^aZ.-D. Sun, R.M. Lees, L.-H. Xu, M. Yu. Tretyakov, and V.V. Dorovskikh, *Rev. Sci. Instrum.* **75**, 1052 (2004).

^bZ.-D. Sun, F. Matsushima, S. Tsunekawa, and K. Takagi, *J. Opt. Soc. Am. B* **17**, 2068 (2000).