A TORSION-VIBRATION COMBINATION BAND IN METHANOL FOR A CH STRETCH VIBRATION WITH INVERTED TORSIONAL STRUCTURE

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Recently a local mode theory was employed by Wang and Perry [1] to explain the inverted torsional energy level structure ($'A'$ above $'E'$) in the asymmetric CH stretch vibrational states of methanol. In order to investigate the torsional energy level structure of these vibrations, we looked for transitions reaching the first excited torsional state (v_t=1) in these vibrational states. High resolution Fourier transform spectra of methanol were recorded at Doppler limited resolutions (typically 0.004 cm^{-1}), around the CH-Stretch fundamental region, at a maximum effective path length of 96m and a pressure of about 0.8 torr in various runs. The spectrum exhibits excellent S/N even when the intensity falls below about 1 percent of the fundamental band. Despite the weak and complicated spectral pattern it was possible to identify a substantial number of K sub-bands terminating at the v_t=1 asymmetric CH-stretch levels. Results of the analysis will be presented in terms of torsional vibrational energy as a function of axial rotation and torsional energy splitting.

[1] X. Wang and D.S. Perry, J. Chem. Phys. Vol. 109, 10795-10805 (1998).