# $CO_2$ LASER SIDEBAND-MICROWAVE DOUBLE RESONANCE SPECTROSCOPY OF METHANOL IN THE $v_{co}$=1 VIBRATIONAL STATE

Z. D. SUN, S. OGURA, F. MATSUSHIMA, S. TSUNEKAWA, AND K. TAKAGI, *Department of Physics, Toyama University, Toyama 930-8555, Japan*.

Rotational transitions of $CH_3OH$ in the C-O stretching vibrational state ($v_{co}$=1) have been observed in the 40 - 100 GHz frequency region using the infrared-microwave double resonance method. As an infrared radiation source a microwave modulator of $CO_2$ laser was used. Frequencies of more than 50 rotational transitions in $v_t$ (torsional quantum number) = 0 - 2 states have been determined with an accuracy of $\pm$10 KHz. Observed frequencies show generally good agreements with frequencies calculated from term values given in reference (1). The pressure dependence of double resonance signals of methanol has been observed and analyzed by the rate-equation approach to have a good understanding of physical processes in the double resonance effect.

(1) G. Moruzzi, B.P. Winnewisser, M. Winnewisser, I. Mukhopadhyay, and F. Strumia, *Microwave, infrared and laser transitions of methanol* (CRC Press, Inc. 1995).