THE MICROWAVE SPECTROSCOPY OF $HCOO^{13}CH_3$ IN THE SECOND TORSIONAL EXCITED STATE

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Methyl formate ($HCOOCH_3$) is an abundant interstellar molecule, found almost everywhere in the star-forming region. The interstellar abundance of the ^{13}C is about 1/50 of ^{12}C. The ^{13}C substituted methyl formate in the ground and first excited states were already found toward massive star-forming regions including Orion KL. [a] With the aid of the state-of-the-art telescope like ALMA, the pure rotational transitions in the second torsional excited may be identified in the near future and laboratory data are necessary. We recorded the spectra of $HCOOCH_3$ below 340 GHz by using conventional source-modulation microwave spectrometer. The assignment of the pure rotational spectra in the second torsional excited state and the analysis by using pseudo-PAM Hamiltonian, which was effective to analyze the normal species, will be reported.

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[a] C. Favre, M. Carvajal, D. Field, J. K. Jørgensen, S. E. Bisschop, N. Brouillet, D. Despois, A. Baudry, I. Kleiner, E. A. Bergin, N. R. Crockett, J. L. Neill, L. Marguès, T. R. Huet, and J. Demaison, *Astrophys. J. Suppl. Ser.* **215**, 25 (2014).