MICROWAVE SPECTROSCOPY OF THE HCCS AND DCCS RADICALS IN THE VIBRONIC EXCITED STATES

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The microwave spectra of the HCCS and DCCS radicals ($X^2\Pi_i$) in both CCS(ν_5) and H(D)CC(ν_4) bending vibrational states were observed in the frequency range of 160–400 GHz with a dc discharge of the C_2H_2 (or C_2D_2) and CS_2 gas mixture. The rotational transition series for the vibronic $^2\Delta_{5/2,3/2}(\nu_5)$, $\mu, \kappa^2\Sigma(\nu_5)$, $^2\Pi_{3/2}(2\nu_5)$, $^2\Delta_{5/2}(\nu_4)$ and $\mu^2\Sigma(\nu_4)$ states were assigned. The analysis of the effective molecular constants showed that the values of the γ_{eff} constants of the vibronic $\mu, \kappa^2\Sigma$ states were different from each other by 2–3 GHz, which could not be explained by the up-to-date Renner-Teller theory for a single bending mode.
This abnormal Renner-Teller effect may be understood by a new vibronic interaction theory, which was developed by us to consider the cross vibronic interaction between the two bending modes.