SUBMILLIMETER LASER STARK SPECTROSCOPY OF $^{13}$CH$_3$F WITH THE 337 µm LINE OF THE HCN LASER


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Submillimeter laser-Stark spectra have been observed for the isotopic species of methyl fluoride, $^{13}$CH$_3$F, using the 337 µm line of the HCN laser. We have identified the multiplet transitions as $J_K = 18K + 17K$ in the ground vibrational state. Ten distinct families with $K = 8, 9, 10, 11, 12, 13, 14, 15, 16$ and 17 have been observed. Zero-field frequencies for all the transitions are given and in most cases with better accuracy than predicted from the previous constants.

Key words: Submillimeter Wave Laser, Laser-Stark Spectra, $^{13}$CH$_3$F, Stark Shift, Transition Frequency.

Introduction

Many workers have been interested in both the species, $^{12}$CH$_3$F and $^{13}$CH$_3$F because of their importance in photochemistry(1) and submillimeter wave laser development(2-5). The microwave spectroscopy of the species $^{13}$CH$_3$F has been done by Tanaka and Hirota(6) and Infrared Two-photon spectra have been observed by Freund et al.(7) and Shoja-Chaghervand and Schwendeman(8). F. Hegelund and S. Brodersen observed the Raman spectra of the $\nu_2$ and $\nu_5$ bands of $^{13}$CH$_3$F(9). Laser-Stark spectra of $^{13}$CH$_3$F were observed in the 10 µm region and constants.
Figure 1. Laser Stark Spectra of $^{13}$CH$_3$F at 890-760 MHz in the parallel polarization.