INTERNAL ROTATION IN $CF_3I\cdots NH_3$ AND $CF_3I\cdots N(CH_3)_3$ PROBED BY CP-FTMW SPECTROSCOPY

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The pure rotational spectra of $CF_3I\cdots NH_3$ and $CF_3I\cdots N(CH_3)_3$ have been measured by chirped-pulse, Fourier transform microwave (CP-FTMW) spectroscopy between 7 and 18.5 GHz. Both molecules are generated by supersonic expansion of a gas sample containing a small percentage of each precursor in a balance of argon. The spectra of both complexes are consistent with C_{3v} prolate symmetric top structures. The observed spectrum of $CF_3I\cdots NH_3$ displays evidence for internal rotation of NH_3 about the principal axis. More than one hundred transitions of $CF_3I\cdots NH_3$ have been assigned to the internal rotor *A* state allowing rotational, centrifugal distortion constants and a nuclear quadrupole coupling constant for the iodine atom to be determined for this state. Measurements performed using a Balle-Flygare FTMW spectrometer further allow determination of a nuclear quadrupole coupling constant for the ^{14}N nucleus. Many transitions in the spectrum of the $CF_3I\cdots{}^{15}NH_3$ isotopologue have also been measured and the length of the halogen bond between the iodine and nitrogen atoms has been determined. Measurements of hyperfine components in nine different $J''\leftarrow J'$ transitions of $CF_3I\cdots N(CH_3)_3$ have allowed assignment of the spectrum of this complex to determine rotational, centrifugal distortion and nuclear quadrupole coupling constants.