DISPERSED FLUORESCENCE SPECTROSCOPY OF HCF AND DCF: VIBRATIONAL STRUCTURE OF THE X^1A' STATE

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We obtained dispersed fluorescence spectra following excitation of the pure bending transitions 2_0^n and combination bands $1_0^1 2_0^n$ and $2_0^n 3_0^1$ in the A^1A''-X^1A' system of HCF and DCF. The spectra were measured using a 0.3 m spectrograph in combination with a gated, intensified CCD detector, and reveal rich detail regarding the vibrational structure of the X^1A' state up to 10 000 cm^{-1}. For HCF, resonances among the nearly degenerate levels $1_1 2_n$, $2_{n+1} 3_1$, and 2_{n+2} produce a polyad-like structure, and the usual spectroscopic model (Dunham expansion) fails to accurately reproduce the experimental term energies. In contrast, the term energies of DCF are well described by this model. The derived vibrational parameters are in good agreement with $ab\ initio$ predictions. The search for spin-orbit perturbations involving the low lying triplet state will be discussed.