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Fine and hyperfine structure of ro-vibrational levels of the NaK $1\,^3\Delta$ states from $v = 3$ to near the dissociation limit[1] A. D. WILKINS, S. JAWALKAR, J. HUENNEKENS, A. P. HICKMAN, Lehigh University, L. MORGUS, Drew University — Our previous high-resolution spectroscopic studies of the fine and hyperfine structure of ro-vibrational levels of the $1\,^3\Delta$ state of NaK have been extended to include vibrational levels up to $v = 59$, the highest of which are within 4 cm^{-1} of the dissociation limit. Using the IPA method, a potential curve was determined that reproduces all measured levels ($3 \leq v \leq 59$) to an accuracy of $\sim 0.026\,\mathrm{cm}^{-1}$, and C_6 and C_8 coefficients have also been determined from the long range potential. The fine and hyperfine structure of the $1\,^3\Delta$ ro-vibrational levels were analyzed to determine the values A_v and b_F of the spin-orbit coupling constant and the hyperfine Fermi contact constant. The measured fine and hyperfine structure for v in the range $44 \leq v \leq 48$ exhibits anomalous behavior due to the mixing between the $1\,^3\Delta$ and $1\,^1\Delta$ states. The theoretical method has been extended to treat this interaction, and the results provide an accurate representation of the complicated patterns that arise. *Ab initio* calculations of the spin-orbit coupling constants A_v are also underway.

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