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Fine and hyperfine structure of ro-vibrational levels of the NaK $1\,^{1,3}\Delta$ states near the dissociation limit[1] A.P. HICKMAN, A.D. WILKINS, L. MORGUS, J. HERNANDEZ-GUZMAN, J.P. HUENNEKENS, Lehigh 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 hightest of which are within $8\,\mathrm{cm}^{-1}$ of the dissociation limit. Using the IPA method, a potential curve is determined that reproduces all measured levels ($35 \leq v \leq 59$) 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 has been fit using a theoretical model that treats the intermediate angular momentum coupling, leading to 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 $42 \leq v \leq 48$ exhibits anomalous behavior whose origin is believed to be 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.

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