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Analysis of the $1^3\Delta$ Potential Curve of NaK[1] RACHAEL ROETTENBACHER, Ohio Wesleyan University, A. PEET HICKMAN, Lehigh University — The process of determining energy levels from a given potential is relatively straightforward; however, the inverse process, given certain energy levels how to determine the potential is more difficult. In this study, a potential curve of the $1^3\Delta$ state of NaK was created based on experimentally determined energy levels. The goal in this research was to suppress the unphysical wiggles at high internuclear separations found in a previous analysis by using a different method that would better determine the physical shape of the potential of the $1^3\Delta$ state of NaK. The potential fitting program *DPotFit 1.1* by Robert J. Le Roy was used with a modified expanded Morse oscillator (EMO) potential. The modification made to the EMO potential was that a dispersion term, $V_{dispersion}$, was added to account for the behavior of the well at high internuclear separations. The modified EMO potential did not eliminate the wiggles, but it did reduce them. The rms deviation between the calculated and experimental energy levels was 0.021 cm^{-1} for the new fit, compared to 0.026 cm^{-1} for the previous fit. The use of parameters in fitting energy levels is essential; here, the number of fitting parameters was reduced from the previous study. The employment of the modified EMO potential allowed for a better fit to the experimental energy levels and a more realistic potential function for the $1^3\Delta$ state of NaK.

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