**Fitting of a PES for rovibrational calculations on NO2**

Jeremy H. Schryber, Oleg Polyansky, Jonathan Tennyson, *Department of Physics and Astronomy, University College London, Gower Street, London WC1E 6BT*; Per Jensen, *Physikalisch-Chemisches Institut, Justus-Liebig-Universität Giessen, Heinrich-Buff-Ring 58, D-35392 Giessen, Germany.*

We took the potential energy surface for the ground electronic state of $NO_2$ constructed by Tashkun and Jensen[a] using the MORBID Hamiltonian and computer program. We wished to fit this to experimental data using the exact kinetic energy (EKE) operator. Initially, EKE calculations were not possible due to the presence of holes in the surface. A better starting point for the fit was constructed using the method in Polyansky et al[b] whereby MORBID and EKE calculations are combined. We then improved the surface by fitting it to available experimental data using an iterative least-squares fitting procedure. In the low-energy region ($<$10,000 $cm^{-1}$) the fitting was successful. Above approximately 10,000 $cm^{-1}$ the higher electronic state begins to peturb the vibrational energy levels of the ground state. We were unable to fit the surface well to the experimental data above 10,000 $cm^{-1}$. We aim to provide a surface which will give accurate rovibrational levels of $NO_2$.

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[a] S.A. Tashkun and P. Jensen, *J. Mol. Spec.,* **165**, 173-184 (1994).

[b] O.L. Polyansky, P. Jensen and J. Tennyson, *J. Chem. Phys.,* **101**, 7651-7657 (1994).