MEASUREMENT OF THE PURE ROTATIONAL QUASIBOUND SPECTRA OF HeH$^+$ AND HeD$^+$ IN A LABORATORY PLASMA BY DIRECT LASER ABSORPTION

Z. LIU, W. Y. FAN and P. B. DAVIES, Department of Chemistry, University of Cambridge, Cambridge CB2 1EW, UK.

The pure rotational quasibound spectra of HeH$^+$ and HeD$^+$ have been observed in the mid infrared region using diode laser velocity modulation absorption spectroscopy. Four quasibound to quasibound ($Q-Q$) and three bound to quasibound ($B-Q$) transitions of HeH$^+$ and one bound to quasibound transition of HeD$^+$ have been detected in a low pressure ac glow discharge. The highest quasibound level involved in the spectra (HeH$^+$, $\tau=0, J=26$) is 2000 cm$^{-1}$ above the dissociation limit. The measured transition frequencies are in very good agreement with ab initio calculations. Two of the $Q-Q$ transitions have wider linewidths due to lifetime broadening.