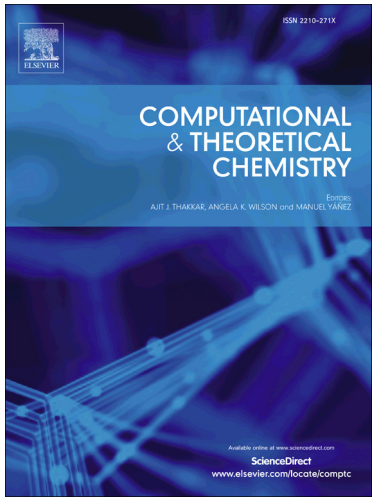


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# Two-dimensional confinement of hydrogen molecular ion

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## ABSTRACT

Using the Born – Oppenheimer approximation, and considering the nuclei fixed at the foci, a study of the hydrogen molecular ion ($H_2^+$), confined strongly in two dimensions by ellipses of different size $\xi_0$, is done. The Schrödinger equation is solved numerically in elliptic coordinates ($\xi$, $\eta$), applying the separation of variables method. The equations for $\xi$ and $\eta$ are solved following an iterative process, until the energy and separation constant become consistent with the size of the confining ellipse characterized by the parameter $\xi_0$ and the internuclear distance R. The energies for the ion at its ground state and the equilibrium distance between the nuclei are obtained, for different values of $\xi_0$, as well as the polarizability of the molecule.

**Keywords:** Schrödinger equation Born – Oppenheimer approximation, energies of the ion, equilibrium distance between nuclei, polarizability of the molecule.

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