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QUASICLASSICAL STUDY OF THE QUANTUM MECHANICAL TWO-COULOMB-CENTRE PROBLEM¹

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The recurrent scheme of finding the quasiclassical solutions of the one-dimensional equation at separation of the Schrödinger equation in the prolate spheroidal coordinates has been elaborated. By means of this scheme of WKB expansions quasiclassical two-Coulomb-centre wave functions for large distances between the fixed positive charges (nuclei) have been constructed for the entire space of the negative particle (electron). Our method provides simple uniform estimates for eigenfunctions at arbitrary internuclear distances R including the $R \gg 1$. In contrast to perturbation theory, the interaction need not be very small in quasiclassical approximation, and its applicability domain is hence wider that permits analyzing qualitative laws for the behavior and properties of quantum mechanical systems.

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