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Theoretical investigation of the resonance states of low-dimensional two-body system in external electric field

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The model of a two-dimensional (2D) hydrogen atom in external electric field is investigated.
Due to the anisotropy of the influenced interaction the partial wave analysis is ineffective. The algorithm for the numerical solution of the 2D time-dependent Schroedinger equation with anisotropic interaction is proposed. The good convergence and advantages of the algorithm are presented. The good agreement of the numerical results with perturbative theory results for the 2D hydrogen atom in weak external static electric field was obtained.
Two methods of the time-dependence of the wave function integration were compared - the split-operator method is much faster than the conventional Crank–Nicolson scheme and has the same accuracy. The verified algorithm can be applied to the investigation of the shape and structure of resonance states, e.g. their energies and widths, of the 2D hydrogen atom in external electric field (Stark effect).

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