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Z(4)-DDM: A γ-rigid solution of the Bohr Hamiltonian with Davidson potential for β and γ = 30°

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In this work we modify the Davydov-Chaban Hamiltonian describing the collective motion of γ-rigid atomic nuclei by allowing the mass to depend on the nuclear deformation. We construct Z(4)-DDM (Deformation-Dependent Mass) model by considering the Davidson potential, and solve the problem by techniques of asymptotic iteration method (AIM). We compare the results of the calculated spectra and $B(E2)$ transition rates for series of $^{108-116}$Pd and $^{190-198}$Pt isotopes with experimental data as well as with other theoretical models. Exact analytical expressions are derived for spectra and normalized wave functions of Davidson potential. The obtained results show an overall agreement with the experimental data and an important improvement in respect to other models. Prediction of a new candidate nucleus for triaxial symmetry is made.

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