Davydov-Chaban Hamiltonian within the Formalism of Deformation-Dependent Effective Mass for the Davidson Potential

P. Buganu[1], **M. Chabab**[2], **A. El Batoul**[2], **A. Lahbas**[2], **M. Oulne**[2]

[1]Department of Theoretical Physics, National Institute for Physics and Nuclear Engineering, Str. Reactorului 30, RO-077125, POB-MG6, Bucharest-Magurele, Romania

[2]High Energy Physics and Astrophysics Laboratory, Faculty of Sciences Semlalia, Cadi Ayyad University, P. O. B. 2390, Marrakesh 40000, Morocco

In this work, we modify the Davydov-Chaban Hamiltonian describing the collective motion of a γ-rigid atomic nucleus by allowing the mass to depend on nuclear deformation. Exact analytical expressions are derived for energy spectra as well as normalized wave functions for the Davidson potential. The model, called Z(4)-DDMD (Deformation Dependent Mass with Davidson potential), is achieved by using techniques of Asymptotic Iteration Method (AIM). The numerical calculations for energy spectra and $B(E2)$ transition probabilities are compared to the experimental data of several nuclei ranging from ^{98}Ru to ^{200}Pt. The obtained results show an overall agreement with the experiment and an important improvement in respect to other models. On the basis of the present model, the staggering effect appearing in energy spectra of triaxial nuclei will be also treated.