Excited state properties of deformed ^{176,177}Hf nuclei

M. J. Ermamatov[1,2] and A. Frank[1]

[1]*Instituto de Ciencias Nucleares, Universidad Nacional Autónoma de Mexico, 04510 México, D.F., Mexico*

[2]*Institute of Nuclear Physics, Ulughbek, Tashkent 100214, Uzbekistan*

In [1] the Bohr Hamiltonian proposed for the three different mass parameters for rotation, β and γ vibration modes. Properties of four well-deformed axially symmetric even-mass nuclei have been studied. It was shown that using different mass parameters very important in calculating inter-band E2 transition probabilities. The angular momentum dependent value of the β vibration variable was found from the minimum condition of the effective potential. In this case the effect of changing angular moment dependent equilibrium value of the β vibration variable is taken into account.

If the Davidson potential is used, it is enough to keep the interaction between rotation and vibration, instead of finding angular momentum dependent equilibrium values of β variable from the minimum condition of effective potential, in order to take into account a similar effect. This was done in [2], however one common mass parameter has been used for the rotation and vibration modes.

In [3] we have considered the Bohr Hamiltonian with different mass parameters as in [1] for even-mass nuclei, but using Davidson potential for β vibration. This approach was applied also to the odd nucleus ^{173}Yb. In [4] Coriolis contribution to the excited states of two deformed odd nuclei has been considered.

In this work, first excited states of even-mass nucleus ^{176}Hf has been investigated using the approach [1-3], and then, the approach which has been applied to the odd-mass nuclei in [4] applied to ^{177}Hf nucleus, which is nearest adjacent to ^{176}Hf.

Excited state energies and reduced E2 transition probabilities have been calculated for the ^{177}Hf nucleus in this approach, using parameters determined from the comparison of the spectrum and reduced E2 transition probabilities of even ^{176}Hf nucleus with experimental data.

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