A Study on Some Heavy Nuclei by Using Theoretical Models

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This thesis deals with the study of the properties of some heavy deformed nuclei; 120 ≤ A ≤ 232; in the framework of the Core-cluster model.In this model the suitable core-cluster combination is determined using the available data of the considered nuclei. In this work the following nuclei are considered; Xe, Ba, Er, Hf, Os and Th. The 12C and 14C clusters are taken in all cases of the considered nuclei.In this work, the interaction potential between the core and the cluster nuclei are taken as one of the following potential forms; pure Woods Saxon, symmetric Woods Saxon, modified Woods Saxon and Gaussian potentials beside the Coulomb potential form. The potential parameters are adjusted using the chi-square test.Using Bohr-Sommerfeld relation, the energy levels are calculated in case of the all considered nuclei.The wave functions are calculated numerically using the Fox Godwin method. Also, the transition probabilities are calculated in case of all considered isotopes. The obtained results using the different potential forms are compared to the available experimental data.from this study one can conclude that, the predicting results of the energy levels by using the Gaussian potential form, give the best agreement with the experimental data comparing to the other potential forms, in the most cases of the considered nuclei. Also the calculated reduced transition probabilities using the Modified Woods-Saxon potential give the best agreement with the experimental data in the most cases of the considered nuclei. This reflects the ability of the core-cluster decomposition model to describe -the properties of the pure rotational ground state band of the heavy deformed even even nuclei.The thesis consist of three chapters; chapter I, is the general introduction to nuclear models and nuclear structure. Chapter II, contains the used model to calculate the ground state energies and the transition probabilities. Chapter III, contains the results and discussions and three appendices.This thesis deals with the study of the properties of some heavy deformed nuclei; 120 ≤ A ≤ -232; in the framework of the Core-cluster model.In this model the suitable core cluster combination is determined using the available data of the considered nuclei. In this work the following nuclei are considered; Xe, Ba, Er, Hf, Os and Th. The 12C and 14C clusters are taken in all cases of the considered nuclei.In this work, the interaction potential between the core and the cluster nuclei are taken as one of the following potential forms; pure Woods Saxon, symmetric Woods Saxon, modified Woods Saxon and Gaussian potentials beside the Coulomb potential form. The potential parameters are adjusted using the chi-square test.Using Bohr-Sommerfeld

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