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CALCULATIONS OF THE OCTOPOLE DEFORMATION OF RADIUM AND THORIUM ISOTOPES IN THE HARTREE-FOCK-BOGOLYUBOV APPROXIMATION WITH SKYRME FORCES

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In the Hartree-Fock-Bogolyubov (HFB) approximation, assuming the axial symmetry of nuclei with Skyrme forces (SkM* and SLy4), we calculated the properties of Ra and Th isotopes with A = 218 –230. These isotopes are currently intensively studied for the presence of octupole deformation in them. In addition, HFB calculations of the properties of Ra and Th isotopes were carried out in the vicinity of the neutron drip line with A = 280 –290. We used the computer code HFBTHO v2.00d [1] in our calculations. Pairing of nucleons in nuclei is described by density-dependent zero-range pairing forces with different sets of pairing force constants. In the calculations, we used the constrained conditions on the parameters of the quadrupole $_2$ and octupole $_3$ deformations of nuclei and refining calculations without the constrained conditions in the vicinity of the minimum of the dependence of the total nuclear energy $E(_2, _3)$ on $_2$ and $_3$. It is shown that for the considered isotopes Ra and Th, the value of $_3$ nuclei strongly depends on the choice of the parameters of the nucleon pairing force. The preferred values of the constants of the pairing forces of neutrons and protons for the considered isotopes Ra and Th were selected from a comparison of the calculated values of the proton and neutron energy gaps with their values calculated from the even-odd differences in the masses of neighboring nuclei. The increase in the pairing strength leads to a decrease or complete disappearance of $_2$ and $_3$ in the considered isotopes Ra and Th.

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