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$\Delta I = 1$ "STAGGERING" EFFECT IN THE SPECTRUM OF BAND OF EVEN-EVEN NUCLEI

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A non-adiabatic collective model that takes into account the relationship of rotational motion with longitudinal and transverse vibrations of the quadrupole type of the surface of the nucleus allows us to explain a number of patterns observed in the excitation spectra of deformable non-axial even-even nuclei.
Various well-known types of deviations of nuclear collective motion from purely rotational are known. As a result of these deviations, high-order effects such as "squeezing", "backbending" and "staggering" occur in the structure of the nuclear rotational spectrum.
In particular, the "staggering" effect represents the branching of rotational bands in a sequence of states that differ by several units of angular momentum. The use of discrete approximations of high-order derivatives of a given nuclear characteristic as a function of a particular physical quantity shows various forms of even-odd "staggering" effects that carry information on the fine properties of nuclear interaction and the corresponding high-order correlations in the collective dynamics of a system.
Collective excitations of even-even nuclei of a quadrupole type were studied in the framework of the approximation with arbitrary nonaxiality. In the framework of this approximation, the zigzag behavior of the $\Delta I = 1$ "staggering" effect in the energy spectrum of the collective excitation of the γ-band of heavy even-even nuclei of ^{152}Sm, ^{156}Dy, ^{164,166}Er and ^{230}Th is considered. Moreover, the first and second order terms in the expansion of the rotational energy operator in the variable γ are taken into account in the description of the energy of the levels of the nuclei under consideration. It was shown that the $\Delta I = 1$ "staggering" effect occurs in the case of strong coupling of the ground and γ-bands in the framework of the SU(3) dynamic symmetry.

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