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NON-MARKOVIAN NUCLEAR DYNAMICS

A prove of equations of motion for the nuclear shape variables which establish a direct connection of the memory effects with the dynamic distortion of the Fermi surface is suggested. The equations of motion for the nuclear Fermi liquid drop are derived from the collisional kinetic equation. In general, the corresponding equations are non-Markovian. The memory effects appear due to the Fermi surface distortions and depend on the relaxation time. The main purpose of the present work is to apply the non-Markovian dynamics to the description of the nuclear giant multipole resonances (GMR) and the large amplitude motion. We take also into consideration the random forces and concentrate on the formation of both the conservative and the friction forces to make more clear the memory effect on the nuclear dynamics. In this respect, the given approach represents an extension of the traditional liquid drop model (LDM) to the case of the nuclear Fermi liquid drop. In practical application, we pay close attention to the description of the descent of the nucleus from the fission barrier to the scission point.

Keywords: Fermi liquid, giant multipole resonances, nuclear fission, memory effects.