NUCLEAR FISSION AND THE WIDTHS OF THE ISOSCALAR GIANT MULTIPOLE RESONANCES

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The dissipative collective motion in nuclei is investigated within the Fermi-liquid model. In the case of large-amplitude collective motion, the macroscopic equations for the nuclear shape parameters are derived from the pressure tensor, the velocity field, and the equations of motion for the nuclear density. The approach is used both for the description of induced symmetric nuclear fission and isoscalar giant multipole resonances in nuclei. The dynamics of the induced nuclear fission during the descent from the fission barrier to the scission point is described with the help of a two-parametric family of Lawrence shapes. The scission line is determined from the instability condition of the nuclear shape with respect to variations of the neck radius. The viscosity coefficient of the nuclear fluid is obtained from the comparison of the experimental value of the fission-fragment kinetic energy with the computed one. The widths of giant quadrupole resonances are calculated with the obtained value of the viscosity coefficient. The calculated widths are about two times smaller than the experimental values. Therefore, the width of a giant multipole resonance is formed not only by ordinary two-body viscosity but also by a nondissipative contribution that absents on the definition of the dissipative energy during the nuclear descent from the fission barrier.