

# THE FUSION OF HEAVY IONS WITHIN THE TWO STEP REACTION MODEL

V. L. Litnevsky, F. A. Ivanyuk, G. I. Kosenko, V. V. Pashkevich

We consider the approaching stage of fusion-fission reactions. The state of the total system is characterised by the three collective parameters: the quadrupole deformations of the target nucleus and the incoming ion and the distance between their centers of mass. We assume “nose to nose” orientation of the projectile and target. The dynamics of the process is described by the Langevin equations for the mentioned above collective parameters. The shell effects of the projectile and target are taken into account in the interaction energy. The numerical calculations are carried out for two reactions: reactions with deformed ( $^{100}\text{Mo} + ^{100}\text{Mo} \rightarrow ^{200}\text{Po}$ ) and spherical ( $^{208}\text{Pb} + ^{18}\text{O} \rightarrow ^{226}\text{Th}$ ) in ground state ions. It is shown that the account of shell effects in the deformation energy influences not only the fusion process as a whole (the fusion barrier height, the dependence of the touching probability on the initial kinetic energy) but also the processes in each ion (their shape and excitation energy).

*Keywords:* fusion-fission reactions, Langevin equations, deformation energy, shell effects.