

SIMULATED EXPANSION AND ION FRONT FORMATION OF ULTRACOLD PLASMA

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We report the direct molecular dynamics simulation results of the ultracold two-component plasma expansion. Interaction between charges is described by Coulomb's law. The number of particles varies from 10^3 to 10^5 . It is shown in the article that the expansion of the plasma begins with the evaporation of some of the electrons and with the transfer of their kinetic energy to the energy of the electric field. After that, the field increases the kinetic energy of the ions. An important result is the detection of the supersonic ion wave formation. On the basis of the calculation results, equations and self-similar solutions are obtained. General dependences on plasma parameters are determined, which are compared with experimental data.