RELAXATION IN THE VOLUME AND ON THE SURFACE OF NONEQUILIBRIUM TWO COMPONENT STRONGLY COUPLED PLASMAS

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The relaxation processes from strongly nonequilibrium states are studied by molecular dynamics simulations for strongly coupled plasmas. The formation of electric double layer at the surface of an initially homogeneous plasma slab is considered. The width and structure of electric double layer was found to be dependent on the plasma nonideality parameter. The expansion of electrons to a vacuum region is characterized by a decrease of kinetic energy.

This process is compared to the relaxation in the volume for homogeneous two-component plasma when non-equilibrium state is prepared by disturbing the velocities of electrons. In particular the relaxation of electrons and ions is studied after the velocities of electrons are dropped. This process consists of an initial stage with non-Boltzmann dynamics and further relatively slow Boltzmann relaxation. The first stage is characterized by an oscillatory increase of kinetic energy of electrons accompanied by a fast relaxation of the velocity distribution function. It was noted that the relative importance of non-Boltzmann stage decreases with decrease of plasma coupling parameter. In the Boltzmann stage the kinetic energies of electrons and ions exponentially approach the equilibrium. Different kinds of smooth and moving surface of plasma slab are considered as well.

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