Experimental study of unstable states and kinetic heating of dust particles in a gas discharge

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In experiments with dusty plasma a wide variety of structural configurations is observed. The formation of separate dusty chains is often observed in experiments with inductive RF discharge plasma and direct current glow discharge plasma. To understand the processes occurring in chain systems, it is important to study a system of two interacting particles.
Another interesting experimental feature is the anomalously high kinetic energy of macroparticles compared to the temperatures of neutrals, ions, and electrons. The dominant mechanism of kinetic heating in an ionized medium with ion drift can be associated with the effect of ion focusing in the wake that occurs behind a macroparticle when the directed ion flow is disturbed.
We present the results of a study of the interaction between dust particles under the conditions of the coexistence of two stable configurations of a pair of particles (vertical and horizontal). The data obtained made it possible to test the criteria for the configurational instability of the system. An experiment was also carried out to study the mechanism of kinetic heating of dust particles in a gas-discharge plasma. An experimental verification of the previously developed model of kinetic heating of a system of two interacting particles was carried out. It was shown that the work of the effective interparticle interaction forces is indeed the dominant mechanism.
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