

The method of determination of dusty plasma parameters from the mass-transfer evolution functions

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The dusty plasma is very common in nature and is also generated during some technological processes. Laboratory dusty plasma is an ionized gas containing small grains of solid matter (dust) that becomes electrically charged. In dusty plasma, micron-size grains acquire a significant electric charge, and this can lead to the formation of dust structures (similar to a liquid or to a solid). Very important is that the separate grains in dusty plasma can be simply registered. This makes it a good experimental model for studying different strongly coupled systems, e.g. liquids, at the “kinetic” level, which is very important for testing the existing phenomenological models in the theory of liquid state, as well as for creating new models.

In this work, the diagnostic technique for dusty plasma is proposed. It is based on studying of mass-transfer processes in dusty subsystem. Knowing the displacements and velocities of grains, we determine the friction coefficient (which appears due to collisions of grains with molecules of buffer gas), average kinetic temperature of grains and their characteristic oscillation frequency. Also the charge of macroparticles and the coupling parameter of the dusty subsystem are estimated.