Influence of the wake potential on the properties of dusty plasma

Kolotinskii D A[1,2,@] **and Timofeev A V**[1,2]

[1] Joint Institute for High Temperatures of the Russian Academy of Sciences, Izhorskaya 13 Bldg 2, Moscow 125412, Russia
[2] Moscow Institute of Physics and Technology, Institutskiy Pereulok 9, Dolgoprudny, Moscow Region 141701, Russia

[@] kolotinskiy.da@phystech.edu

Dusty plasma is a weakly ionized gas that contains condensed matter particles of micron and submicron sizes [1]. These particles usually have a negative charge due to the difference in the mobility of ions and electrons in plasmas. In the absence of external electric fields, ions and electrons are distributed in space radially symmetrically and screen the electric potential of the dust particle. This potential also has radial symmetry and in the linear approximation can be described by the Debye–Huckel expression. However, the overwhelming majority of experiments with dusty plasma are ground-based, and in order for dust particles to levitate, the system is placed in an external electric field. An example of such a system can be a dc or rf discharge with dust particles inside. The presence of an electric field leads to a deviation of the ion distribution in space from the radially symmetric case, and the potential around the dust particle also loses its radial symmetry. The anisotropy of the potential around a dust particle can have a significant effect on the structural and dynamic properties of a system of dust particles. In this work, a theoretical study of the effect of the wake potential on the dynamics of two dust particles in the gas discharge plasma is carried out. It is shown that when the particles are located parallel to the ion flow, the oscillations of the downstream particle are pumped. The influence of the parameters of the complex plasma system on the dynamics of two dust particles is investigated.

[1] Fortov V E, Khrapak A G, Khrapak S A, Molotkov V I and Petrov O F 2004 *Phys. Usp.* **47** 447