It is well known that a charged particle or macroobject, immersed in a flowing plasma, creates a perturbed region (a wake) behind itself. Wakefield potential is often invoked to explain a vertical alignment of dust particles levitating in the plasma sheath of capacitive radio-frequency (RF) discharge. In such a plasma ions have a directed velocity relative to stationary dust particles which can lead to focusing of ion fluxes behind negatively charged particles and, as a consequence, to difference between the interaction of dust particles in the directions perpendicular to the ion flow and parallel to it.

To date, the experimental determination of the pair interaction forces have been carried out between horizontally aligned particles [1], [2] sus- pended in the sheath of capacitive RF discharge; as well as between heavy probe particle and dust cloud in the diffuse edge of inductive (electrode-less) RF discharge [3]. In all this cases the interparticle interaction can be described in the isotropic approximation.

In this report we consider a possibility of experimental diagnostics of anisotropic interaction forces between dust particles in plasmas, arising due to effects of ion focusing. To recover anisotropic interparticle interaction forces we improved the method based on solving the inverse Langevin problem[2].

We verified the method on the results of numerical simulation of chain structures of particles with quasidipole-dipole interaction, similar to the one occurring due to effects of ion focusing in gas discharges. It was shown that the proposed method can recover the spatial distribution of anisotropic interparticle interaction forces, and can be used for diagnostics of a laboratory dusty plasma with ion flow. An influence of charge spatial inhomogeneity and fluctuations on the results of recovery is also discussed.

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