**High-speed imaging for the diagnostics of rotating cluster in radio-frequency (RF) plasma**

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Dusty plasma diagnostics is mainly performed by means of high-speed imaging techniques [1]. The sequences of images acquired by a high-speed camera are further processed through Particle Tracking Velocimetry (PTV) analysis technique to investigate the cluster dynamics. Here by we show the dusty plasma diagnostics of a cluster rotating under the influence of an electron beam [2]. In the experiment the dust cluster composed of spherical dust particles with radius and made of melamine-formaldehyde with density is levitated in the sheath of a radio-frequency (RF) plasma. The experiments were performed in a RF discharge in argon at pressure p=90 mTorr and discharge power of 3 W. The microparticles are illuminated by a laser sheet from a diode laser of 20 mW and irradiated by a pulsed electron beam (EB) with energy in the range 8-12 keV and peak current of 4 mA. The electron beam used to irradiate the cluster has pulse frequency of 56 Hz and pulse duration of 40 µs. The images of the dust microparticles trajectories were acquired in time by a Photron CCD camera. For the analysis of the cluster rotation the image data is used to construct Voronoi diagrams, to calculate inter-particle spacing and to obtain pair correlation functions.

[1] C. Ticoş, D. Toader, M. Munteanu, N. Banu, A. Scurtu (2013), High-speed imaging of dust particles in plasma. Journal of Plasma Physics, **79** (3), 273-285.

[2] D. Ticoş, A. Scurtu, J. D. Williams, L. Scott, E. Thomas, Jr., D. Sanford, and C. M. Ticoş (2021), Rotation of a strongly coupled dust cluster in plasma by the torque of an electron beam, Phys. Rev. E **103**, 023210.