

Abstract Submitted
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Attraction during binary collision of fine particles in Ar plasma

MASAHIRO SOEJIMA, TEPPEI ITO, DAISUKE YAMASHITA, NAHO ITAGAKI, HYUNWOONG SEO, KAZUNORI KOGA, MASAHARU SHIRATANI, Kyushu University — Forces exerted on fine particles in plasmas play central roles in their transport, agglomeration, as well as Coulomb crystals and liquids. The forces are complicated because of charge fluctuation of fine particles, charge screening in plasma, anisotropy of plasma flow, and so on. Various formulas of such forces have been theoretically predicted but many of them have not been supported by experimental results yet. Here we carried out experiments on binary collision of fine particles using Ar rf-discharge plasmas. PMMA fine particles of $10\mu\text{m}$ diameter were injected into the plasma and they were levitated around the plasma sheath boundary. The number of fine particles levitated was so small that we can observe non-collective pair interaction. We observed binary collisions of fine particles with a high speed and high resolution camera. We found that repulsion of two fine particles takes place in short distances, whereas attraction takes place in middle distances. These results indicate that inter-molecular like potential exists between them. The attraction corresponds to non-collective fine-particle attraction due to shadow effects.

Masahiro Soejima
Kyushu University

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