2nd Asia-Pacific Conference on Plasma Physics, 12-17,11.2018, Kanazawa, Japan

# Wave phenomena at the interface of a binary complex plasma: experiments and simulations

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A complex plasma is a weakly ionized gas containing electrons, ions, neutral atoms and small macroscopic particles. Such system allows experimental studies of various physical processes occurring in liquids and solids at the kinetic level. In this talk, we present experiments and simulations on the wave phenomena in a phase-separated binary complex plasma.

A series of experiments on density waves in a binary complex plasma were performed in PK-3 Plus laboratory on board the International Space Station (ISS) [1-3]. For the big particles, waves were self-excited by the two-stream instability, while for small particles, they were excited by heartbeat instability. By studying the dynamics of wave crests at the interface, we recognize a ``collision zone'' and a ``merger zone'' before and after the interface, respectively. The results provide a generic picture of wave-wave interaction at the interface between two “mediums” [4].

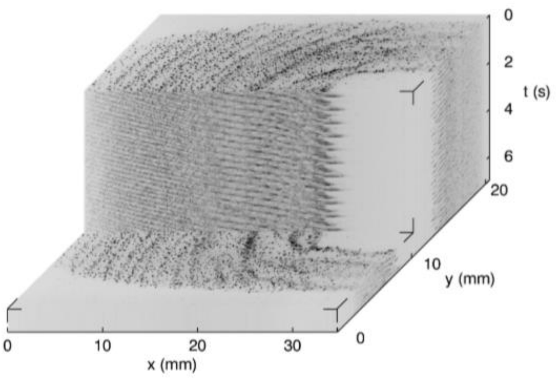


Figure 1 Propagation of the self-excited waves in a binary complex plasma: experiment performed on board the International Space Station.

The propagation of a dissipative solitary wave across an interface is studied in a binary complex plasma. The experiments were performed under microgravity conditions in the PK-3 Plus Laboratory. The interfacial effect was observed by measuring the deceleration of particles in the wave crest. The results are compared with a Langevin dynamics simulation. Reflection of the wave at the interface was directly observed. By tuning the ion drag force exerted on big particles in the simulation, the effective width of the interface was adjusted. We show that the strength of reflection increases with narrower interfaces [5].

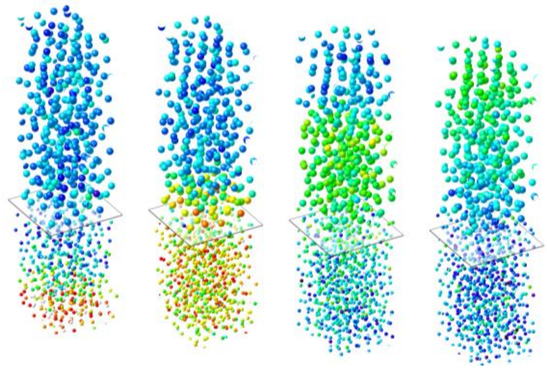

Figure 2 Propagation of the solitary wave in a binary complex plasma: Langevin dynamics simulation.

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