Solitary Rarefaction Wave in Three-Dimensional Complex Plasma

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Abstract. Observation of a solitary rarefaction wave in a three dimensional complex plasma is presented. The experiments are performed in a capacitively coupled, symmetrically driven RF discharge. The discharge chamber is a modified version of the PK3plus setup installed on board the ISS. A gas temperature gradient of 400K/m is applied to compensate gravity and to levitate the particles in the bulk plasma. The particle cloud is formed by monodisperse MF particles with a diameter of 3.42±0.06 µm. The wave is exited by a short voltage pulse applied to the electrodes of the RF discharge chamber. We observed a pulse-like wave propagating with an average velocity of 1.14±0.02 cm/s. Particle dynamics is discussed in detail.

FIGURE 1. Profile of the solitary rarefaction wave in Neon at 24.1Pa

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