Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Evolution of Self-organized Poloidal Dust Rotation with Neutral Pressure in a Direct Current Glow Discharge MANJIT KAUR, SAYAK BOSE, P.K. CHATTOPADHYAY, J. GHOSH, D. SHARMA, Y.C. SAXENA, Inst for Plasm Res — Poloidal rotation of mono-dispersed dust particles in toroidally symmetric structures is obtained experimentally in an unmagnetized parallel plate dc glow discharge at high pressures, using a concentric metallic ring placed over surface of cathode. The poloidal rotation of dust particles is observed to be localized above the ring. A radial gradient in the ion drag force arising due to a radial density gradient above the ring is identified as the principal cause of dust rotation [1]. The evolution of this poloidal dust rotation with background gas pressure is studied. A transition from a filled-vortex (poloidal cross-section of the toroidal structure) to a vortex with void at the centre is observed with increase in fill-in gas pressure accompanied by a decrease in vortex height from cathode surface. The velocity of the dust particles is observed to increase with an increase in neutral gas pressure. This observation contradicts the obvious interpretation of slowing down of dust rotation due to an increase in neutral frictional force which increases with pressure. These experimental results with probable causes will be presented in details.

[1] Kaur et al., Phys. Plasmas 22, 033703 (2015).

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Date submitted: 24 Jul 2015 Electronic form version 1.4