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Observations and analysis of poloidal flows in dusty plasmas¹ STEPHEN ADAMS, SHANE MOORHEAD, CHRISTIAN POLKA, DANIEL ROBINSON, UWE KONOPKA, EDWARD THOMAS, Auburn University, MAN-JIT KAUR, PRABAL CHATTOPADHYAY, DEVENDRA SHARMA, Institute for Plasma Research (IPR), India — Dusty plasmas are a four-component plasma system consisting of electrons, ions, neutral atoms, and charged nanometer- to micronsized micro particles (i.e., "dust"). In recent experiments at the Institute for Plasma Research (IPR), observations of toroidally shaped dust rings, with strong poloidal rotation were reported. The Auburn dusty plasma group has reproduced these experiments using the large, octagonal vacuum chamber designed for the Magnetized Dusty Plasma Experiment. These studies use a dc discharge plasma at high pressure (p > 200 mTorr), over a broad range of discharge currents (up to 10 mA), to produce toroidal, semi-toroidal, disc-shaped, or ring-like dust structures. Frequently, these structures exhibit a steady-state poloidal flow. In these studies, particle image velocimetry (PIV) is used to characterize the transport of the charged microparticles. Initial results will be presented on the evolution of the particle flow as a function of the experimental parameters and a preliminary analysis of the particle motion using a balance between ion drag and gravitational forces will be presented.

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