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Amplitude Scaling of Asymmetry-Induced Transport in a Non-neutral Plasma Trap[1] D.L. EGGLESTON, Occidental College — We are studying asymmetry-induced transport using a modified Malmberg-Penning trap in which the plasma is replaced by a biased wire running along the axis of the trap. Test electrons injected into this trap have the same basic dynamical motions as particles in a non-neutral plasma: axial bounce motion and azimuthal drift. The test electron density is kept low enough to avoid collective resonances which greatly simplifies determination of the fields produced by applied wall voltages but does not seem to change the transport physics: the unperturbed confinement[2] in this device is of the same magnitude and scaling as in comparable plasma devices. The spectrum of the applied asymmetry is also simplified by employing up to forty wall sectors to create it. This reduces the number of terms in the theoretical flux and facilitates comparisons between theory and experiment. Initial experiments indicate that the transport scales like ϕ^2 at the lowest amplitudes (ϕ is the amplitude of the asymmetry), but falls off to roughly $\phi^{4/3}$ at the higher amplitudes. Interestingly, a banana-regime scaling (i.e. $\phi^{1/2}$) is not observed, even at the highest asymmetry amplitudes.

[1]Supported by ONR grant N00014-97-1-0400
[2]D.L. Eggleston, Phys. Plasmas 4, 1196 (1997).

☐ Prefer Oral Session
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