Abstract Submitted
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Particle Dynamics in Asymmetry-Induced Transport: a Computational Study D.L. EGGLESTON, Occidental College — We have developed a simple computer code as an aid to resolving the discrepanies between our experiments[1] and the theory[2] of asymmetry-induced transport. The code employs the fourth- order Runge-Kutta method to advance the particles in prescribed fields matching our experiment. For a single helical asymmety $\phi(r)\cos(kz + l\theta - \omega t)$, significant motion in the radial direction is restricted to those particles near the resonant velocity. Both the location and the width of this resonance are consistent with expectations. When a standing wave asymmetry is used (i.e., two counter-propagating helical waves), additional dynamical behaviors are observed. Stocastic motion occurs when the resonant regions of the two waves overlap, allowing a larger population of particles to undergo large radial excursions. There is also a class of particles with restricted axial motion, as in trapped particle modes[3]. These particles, which also make large radial excursions, are located near the radius where $\dot{\theta} = \omega/l$. Further progress in understanding asymmetry-induced transport may require inclusion of these effects.

[1]D.L. Eggleston and B. Carrillo, Phys. Plasmas **10**, 1308 (2003).
[2]D.L. Eggleston and T.M. O'Neil, Phys. Plasmas **6**, 2699 (1999).
[3]A.A. Kabantsev et al., Phys. Rev. Lett. **89**, 245001 (2002).

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