Abstract Submitted
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The High-Density Fixed Point for Nonneutral Plasma Compression.[1] J.R. DANIELSON, C.M. SURKO, M.W. ANDERSON, T.M. O'NEIL, University of California, San Diego — A new "strong-drive" regime was recently discovered for the radial compression of single component plasmas in Penning-Malmberg traps using a rotating electric field [the so-called rotating wall (RW) technique][2]. The transition to this regime occurs via a bifurcation, and the steady-state density exhibits hysteresis as a function of the applied RW voltage. Plasmas can be compressed until the E x B rotation frequency, ω_E ($\omega_E \propto$ n, the plasma density) approaches the applied frequency, ω_{RW}. Here, we discuss a simple nonlinear model that explains these observations as convergence to an attracting, high-density fixed point - a torque-balanced steady state. Measurements of the RW torque magnitude and dependence on drive voltage are presented. Quantitative agreement is found with a newly developed theory[3] that calculates the torque near the fixed point produced by the Debye-shielded RW electric field. Applications of the RW technique in this high-density, strong-drive regime and factors limiting its utility will be discussed.

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[2]J. R. Danielson and C. M. Surko, *Phys. Rev. Lett.* **95**, 035001 (2005); and *Phys. Plasmas* **13**, 055706 (2006).
[3]M. W. Anderson and T. M. O'Neil, adjacent poster.

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