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Momentum transfer to rotating magnetized plasma from gun plasma injection A.B. HASSAM, IMRAN SHAMIM, R.F. ELLIS, Institute for Research in Electronics and Applied Physics (IREAP), University of Maryland, College Park, F.D. WITHERSPOON, M.W. PHILLIPS, HyperV Technologies Corp. — Numerical simulations are carried out to investigate the penetration and momentum coupling of a gun-injected plasma slug into a rotating magnetized plasma. An experiment along these lines is envisioned for the Maryland Centrifugal Experiment (MCX) using a coaxial plasma accelerator gun developed by HyperV Technologies Corp. The plasma gun would be located in the axial mid-plane and fired off-axis into the rotating MCX plasma annulus. The numerical simulation is set up so that the initial momentum in the injected plasma slug is of order the initial momentum of the target plasma. Several numerical firings are done into cylindrical rotating plasma. Axial symmetry is assumed. The slug is seen to penetrate readily and deform into a mushroom, characteristic of interchange deformations. It is found that upto 25% of the momentum in the slug can be transferred to the background plasma in one pass across a cylindrical chord. For the same initial momentum, a high-speed low density slug gives more momentum transfer than a low-speed high density slug. Details of the numerical simulations and a scaling study are presented.

Sheung Wah Ng
IREAP, University of Maryland, College Park

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