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Plasma Jet Modeling for PLX[1] CAROLINE F. MASON, RODNEY J. MASON, R.J. FAEHL, R.C. KIRKPATRICK, Research Applications Corp — The implicit simulation code ePLAS has been applied to plasma jets generated with mini-rail guns for plasma production and compression aimed at use with PLX. The rails are typically planar, 2.5 cm apart and arranged to transport an initial 1 cm or wider vertical plasma fill some 10 cm into a void. The driving magnetic field is 3.2 T. The plasma singly ionized argon at 10^{17} cm^{-3}. We use ePLAS in both its traditional implicit/hybrid form [1] where it is restricted by an electron Courant time step, and in a new super-hybrid form that extracts the main electron moments from the *E&B*-field solutions. This provides numerical stability at *ion* Courant limits, for at least a 10 times larger time step, thus probing microsecond jet dynamics with computational economy. We examine possible field penetration at the cathode and anode gun electrodes. Cathode erosion and EMHD $B-$Field penetration are possible at lower jet densities [2]. We examine jet transport beyond the gun, modeling possible ionization with either analytic or tabular EOSs. We study the merger of jets with ions represented as either fluids or particles.

[1] R. J. Mason and C. Cranfill, IEEE Trans. Plasma Sci. **PS-14**, 45 (1986)
[2] R. Mason, et al., Phys. Fluids **B, 5**, 1115 (1993).

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