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Characterization of a small railgun-based plasma jet source MAXIMILIAN SCHNEIDER, COLIN ADAMS, MARIUS POPESCU, JOSHUA KORSNESS, MICHAEL SHERBURNE, Virginia Tech — Experimental characterization of a small plasma jet source has been undertaken at Virginia Tech’s Center for Space Science and Engineering Research (Space@VT). The plasma-armature railgun features a square bore approximately 0.5×0.5 cm and a rail length of ≈ 10 cm. Fed by an ≈ 100 psi- gas manifold and powered by an LC pulse-forming network capable of delivering ≈ 100 kA current on timescales of several microseconds, jet velocities in the 10-20 km/s range are predicted. A modular design, the insulators and rails are readily swappable for investigation the interaction of the plasma armature with plasma-facing components fabricated with different materials and geometry. The plasma jet is characterized by a suite of diagnostics including a multichord Mach-Zehnder interferometer, spectrometer, photodiode array, and fast photography. Diagnostics planned for the near future include plasma laser-induced fluorescence and particle energy analyzers. The railgun source described is envisioned as a future platform for basic science experiments on topics ranging from plasma-material interaction to plasma shocks.

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