

Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Results on a 15-Joule theta-pinch FRC-physics test cell for space propulsion research CARRIE HILL, NOLAN UCHIZONO, ERC, Inc, MICHAEL HOLMES, US Air Force — The U.S. Air Force Research Laboratory-Edwards has developed a new experimental test cell to study the physics of Field-Reversed-Configuration (FRC) formation, equilibrium, and acceleration at low-energy for space propulsion. The test-cell is compatible with a variety of plasma sources, including theta-pinch and rotating magnetic field sources. The first plasma source installed in the test-cell was a low-energy (15 J/pulse) theta-pinch source. This source has been tested at full energy with a xenon propellant and argon propellant at a range of fill densities (1-50 mTorr) and bias fields up to 1 kG. The test-cell was equipped with a suite of diagnostics to monitor plasmoid formation, include voltage and current transducers, an excluded flux array, internal magnetic field probes, emission spectroscopy, and Langmuir probes. Several pre-ionization schemes were tested with the source as well to investigate their effectiveness on plasmoid formation. Results on the theta-pinch plasma studies are presented here.

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Date submitted: 11 Jul 2014

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