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Results from an 8 Joule RMF-FRC Plasma Translation Experiment for Space Propulsion CARRIE HILL, NOLAN UCHIZONO, ERC, Inc., MICHAEL HOLMES, U.S. Air Force Research Laboratory — Field-Reversed Configuration (FRC) thrusters are attractive for advanced in-space propulsion technology as their projected performance, low specific mass, and propellant flexibility offer significant benefits over state-of-the art thrusters. A benchtop experiment to evaluate FRC thruster behavior using a Rotating Magnetic Field (RMF) formation method was constructed at the Air Force Research Laboratory. This experiment generated an RMF-FRC in a conical geometry and accelerated the plasma into a field-free drift region, using 8 J of input energy. Downstream plasma probes in a time-of-flight array measured the exhaust contents of the plasma plume. Results from this diagnostic demonstrated that the ejected mass and ion exit velocities fell short of the desired specific impulse and momentum. Two high-speed cameras were installed to diagnose the gross plasma behavior from two perspectives. Results from these images are presented here. These images show that the plasma generated in the formation region for several different operating conditions was highly non-uniform and did not form a stable closed-field topology that is expected from RMF-FRC plasmas.

Carrie Hill
ERC, Inc.

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