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Propagating Magnetic Wave Plasmoid Accelerator JEDIDIAH SMITH, MATTHEW BARTONE, JOHN SLOUGH, University of Washington — A high velocity plasma accelerator has been designed and constructed that has direct application to space propulsion as well as new innovative high energy density approaches to fusion. The Propagating Magnetic Wave (PMW) plasmoid accelerator could also find application as a fueler for ITER, as well as current tokamaks for adding rotational momentum and velocity shear for stability and transport control. Nevertheless, the PMW has a natural application to high power electric propulsion in space. The PMW operates naturally at both high power and efficiency with no need for electrodes or grids, and can also operate over a wide range in both exhaust velocity and propellant mass. To efficiently accelerate plasmoids to high velocities an acceleration method other than the simple tapered coil must be employed. The rapid acceleration of a compact plasmoid is realized through the application of an externally applied propagating magnetic field. Here, the large axial JxB force is generated from the induced azimuthal current inside the plasmoid and the radial component of the external, axially propagating magnetic field. This accelerating force is sustained as long as the plasmoid remains in phase with the wave field. Exit velocities greater than 200 km/sec for plasmoid masses on the order of 0.1 mg are anticipated from the device that is currently being tested, and the results from the initial experiments will be presented. This research is being supported by the U.S. Air Force Research Laboratory, Edwards AFB.

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