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Application of the Physics of the auroral current region in the VASIMR rocket MICHAEL BRUKARDT, EDGAR BERING, University of Houston Department of Physics, FRANKLIN CHANG-DIAZ, JARED SQUIRE, TIMOTHY GLOVER, VERLIN JACOBSON, Advanced Space Propulsion Laboratory, AdAstra Rocket Company — Increasing demands made on spacecraft capabilities are making electric propulsion systems more important to space exploration. One of these electric propulsion systems is the variable specific impulse magnetoplasma rocket (VASIMR). The VASIMR applies and simulates several important physical processes occurring in the magnetosphere. Several auroral current region processes, such as lower hybrid heating, parallel electric field acceleration, and ion cyclotron acceleration are also simulated in the VASIMR. This paper will summarize the physics in the VASIMR engine. The helicon discharge uses lower hybrid heating as the physical mechanism of the ionization source of the VASIMR. Ion exit energy measurements show a substantial parallel field due to ambipolar charge separation in the axial magnetic field of the VASIMR engine. Ion cyclotron heating (ICRH) during a single pass through the resonance region has been achieved. Perpendicular ion cyclotron heating in the VASIMR is shown in ion velocity phase space distribution data.

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