Abstract Submitted
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Investigation of High Frequency Instabilities in the Plume of the VX-200 Magnetic Nozzle[1] MATTHEW GIAMBUSSO, Ad Astra Rocket Company, EDGAR A. BERING, University of Houston, MARK D. CARTER, JARED P. SQUIRE, Ad Astra Rocket Company — During testing of the Variable Specific Impulse Magnetoplasma Rocket (VASIMR®) VX-200 device, high frequency (HF) harmonics of the ion cyclotron heating (ICH) stage were measured in the radial component of the electric field along the upstream edge of the plasma exhaust. The perpendicular electron density gradient in this portion of the plume could allow growth of the lower hybrid drift instability (LHDI) or the modified two-stream instability (MTSI), but the perpendicular DC electric field is generally not strong enough to support these drift waves. It is theorized that the ICH power excites the unstable drift waves; the amplified ICH harmonics are the ones whose frequencies are close to the theoretical frequency of the instability. In a separate but related study, the stability of the exhaust jet is examined under the assumption of cold, homogenous, and uniformly magnetized plasma. A Clemmow Mullaly Allis (CMA) diagram for singly ionized Argon is drawn and annotated with scans through the plasma plume. Finally, a two-dimensional particle-in-cell model of the exhaust plume is developed, simulating a trans-Alfvnic plasma jet, the ion kinetic Beta transitioning from less than one to greater than one.

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