

Abstract Submitted
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Measurement of erosion in helicon plasma thrusters using the VASIMR[®] VX-CR device JUAN IGNACIO DEL VALLE GAMBOA, JOSE CASTRO-NIETO, JARED SQUIRE, MARK CARTER, FRANKLIN CHANG-DIAZ, Ad Astra Rocket Company — The helicon plasma source is one of the principal stages of the high-power VASIMR[®] electric propulsion system. The VASIMR[®] VX-CR experiment focuses solely on this stage, exploring the erosion and long-term operation effects of the VASIMR helicon source. We report on the design and operational parameters of the VX-CR experiment, and the development of modeling tools and characterization techniques allowing the study of erosion phenomena in helicon plasma sources in general, and stand-alone helicon plasma thrusters (HPTs) in particular. A thorough understanding of the erosion phenomena within HPTs will enable better predictions of their behavior as well as more accurate estimations of their expected lifetime. We present a simplified model of the plasma-wall interactions within HPTs based on current models of the plasma density distributions in helicon discharges. Results from this modeling tool are used to predict the erosion within the plasma-facing components of the VX-CR device. Experimental techniques to measure actual erosion, including the use of coordinate-measuring machines and microscopy, will be discussed.

Juan Ignacio Del Valle Gamboa
Ad Astra Rocket Company Costa Rica

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