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History of improvements in single-pass ICRH ion acceleration in the VASIMR engine EDGAR BERING, LEONARD CASSADY, MICHAEL BRUKARDT, University of Houston, FRANKLIN CHANG-DIAZ, JARED SQUIRE, TIMOTHY GLOVER, ALFONSO TARDITI, VERLIN JACOBSON, GREG MCCASKILL, Ad Astra Technologies, Inc., ROGER D. BENGTSON, University of Texas at Austin — The Variable Specific Impulse Magnetoplasma Rocket (VASIMR) is a high power magnetoplasma rocket, capable of Isp/thrust modulation at constant power. The plasma is produced by helicon discharge. The bulk of the energy is added by ion cyclotron resonance heating (ICRH.) Axial momentum is obtained by adiabatic expansion of the plasma in a magnetic nozzle. Thrust/specific impulse ratio control in the VASIMR is primarily achieved by the partitioning of the RF power to the helicon and ICRH systems, with the proper adjustment of the propellant flow. Ion dynamics in the exhaust were studied using probes, gridded energy analyzers (RPA's), microwave interferometry and optical techniques. This paper will review 3 years of single-pass ICRH ion acceleration data. During this interval, the available power to the helicon ionization stage has increased from 3 to 20 kW. The increased plasma density has produced increased plasma loading of the ICRH antenna and isignificant improvements in antenna coupling efficiency and in ion heating efficiency.

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