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High Power Electric Propulsion Using The VASIMR^{TM} VX-200: A Flight Technology Prototype EDGAR BERING III, BENJAMIN LONGMIER, University of Houston, TIM GLOVER, FRANKLIN CHANG-DIAZ, JARED SQUIRE, Ad Astra Rocket Company, MICHAEL BRUKARDT, University of Houston — The Variable Specific Impulse Magnetoplasma Rocket (VASIMR^{TM}) is a high power magnetoplasma rocket, capable of Isp/thrust modulation at constant power. The plasma is produced by a 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^{TM} 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. Results are summarize from high power ICRH experiments performed on the VX-100 using argon plasma during 2007, and on the VX-200 using argon plasma during 2008. The VX-100 has demonstrated ICRH antenna efficiency >90% and a total coupling efficiency of ∼75%. The rocket performance parameters inferred by integrating the moments of the ion energy distribution corresponds to a thrust of 2 N at an exhaust velocity of 20 km/s with the VX-100 device. The new VX-200 machine is described.

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