PRESS RELEASE 012320, JANUARY 23, 2020

Aethera's New RF Power Processing Unit for the VASIMR® Engine Successfully Completes Full Power Vacuum and Magnetic Field Tests at Ad Astra Rocket Company's Texas Facility.

[Webster, Texas USA and Halifax, NS, Canada] – For Immediate Release – A new generation radio-frequency (RF) Power Processing Unit (PPU) for the VASIMR® engine, built for Ad Astra Rocket Company by Aethera Technologies Ltd. of Canada, has completed a full-power test in vacuum at Ad Astra's Texas facility near Houston. The test, conducted on January 20th, involved operating the unit in hard vacuum and thermal steady-state at its full power rating of 120 kW. As part of the test, the PPU was also subjected to the magnetic field of the VASIMR® engine to verify that there is no magnetic effect on the PPU performance.

With this test, Ad Astra successfully completed one of the three remaining major technology milestones in the NextSTEP Partnership Program contract with NASA for the maturation of the VASIMR® engine. With these results, the VASIMR® system is now fully positioned at technology readiness level (TRL) 5; that is, all critical engine components have now been operated at full power in a relevant environment under vacuum.

A critical component of the two-stage VASIMR® engine, the RF PPU provides the RF energy needed to efficiently heat the rocket's argon propellant in the high-power second stage. A similar, lower power RF PPU will be used in the first stage to ionize the propellant. The resulting high-temperature plasma accelerates in the magnetic nozzle to provide rocket thrust.

At a maximum rated power of 120 kW and weighing only 53 kg, the VASIMR® RF PPU is as much as 10x lighter than that of competing electric thrusters and its advanced semiconductor-based design produces greater than 97% DC-to-RF power efficiency. Such remarkable performance has now been demonstrated in vacuum and in proximity to the VASIMR® engine's magnetic field.

The development of the RF PPUs is supported by Ad Astra Rocket Company and the Canadian Space Agency (CSA). CSA's support is part of a contribution agreement under the Space Technology Development Program (STDP) announced by the CSA on May 25, 2018 and expands the international dimension of the VASIMR® project.

Two milestones now remain in Ad Astra's queue and are planned for completion this spring. These involve long-duration 100 kW firings of the VX-200SS VASIMR® test article; one for 5-6 hours to demonstrate thermal control of the engine and a second, for 100 hours, to estimate component life. Upon completion of these milestones, Ad Astra will move to the next technology maturation phase: the development of a TRL-6 VASIMR® engine for a space test.

"Watching the test was like a dream with all parameters maintaining very comfortable margins. What seemed like an easy test was a testimony to the quality of the teams that developed and tested this beautiful piece of equipment," says Jared Squire, Senior VP Research. "The environmental requirements for vacuum and magnetic field were key requirements for the RF PPU and having a successful result on the first test was a big achievement for the design teams" said Tim Hardy, Chief Technology Officer at Aethera. "We're looking forward to continuing positive outcomes as the Ad-Astra team prepares the VASIMR® engine for a space test," he added.

ABOUT THE TECHNOLOGY

Short for Variable Specific Impulse Magnetoplasma Rocket, VASIMR® uses plasma to create thrust. Plasma is an electrically charged gas heated to extreme temperatures and guided by strong magnetic fields. Plasma rockets, such as VASIMR®, have an extremely low fuel consumption and a much higher performance compared to conventional chemical propulsion or other electric rockets. They provide economic and operational advantages in space logistics, including satellite deployment, re-boost, refurbishment and end-of-life disposal. With an appropriate nuclear-electric power source, VASIMR® would provide much faster and safer human and robotic transportation in deep-space where solar power is insufficient.

ABOUT AD-ASTRA

Based in Webster, Texas, Ad Astra Rocket Company is the developer of the VASIMR® engine, an advanced plasma propulsion system for the emerging in-space transportation market. Ad Astra also owns and operates

supporting R&D subsidiaries in the US and Costa Rica developing earthbound integrated solutions in renewable hydrogen energy storage for fuel-cell electric transportation and stationary power, as well as advanced manufacturing and applied physics.

ABOUT AETHERA

Located in Halifax, N.S., Aethera Technologies Limited develops innovative technology and provides related services for its clients with a focus on Radio Frequency (RF) power for aerospace, communications, scientific and industrial applications including dielectric heating. Aethera is committed to transforming ideas into a competitive advantage for our clients.

ABOUT CSA's SPACE TECHNOLOGY DEVELOPMENT PROGRAM

The CSA's Space Technology Development Program (STDP) supports innovation for the growth of the Canadian space sector and aims to reduce technological unknowns. Contracts are issued to Canadian organizations for the development of technologies to support future needs of the Canadian Space Program, while non-repayable contributions are awarded to Canadian organizations to support the development of innovative technologies with strong commercial potential.

Some of the Ad Astra team members who supported the RF-PPU testing pose in front of the open vacuum chamber at the company's Texas facility. The RF-PPU and part of the test hardware can be seen in background (upper center). The main VX-200SS test article fills the upper right portion of the image. Source: Ad Astra Rocket Company.