

To Mars and Beyond: Plasma Rocket Research

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With their main objective to develop a rocket for a manned mission to Mars, UH Professor Edgar Bering and his student, Michael Brukardt, were among the authors of an award-winning technical paper recognized at a recent conference in Portland, Ore.

The paper presents results of research in which Bering and Brukardt are participating at NASA Johnson Space Center surrounding the Variable Specific Impulse Magnetoplasma Rocket (VASIMR), which is a prototype spacecraft electric propulsion system intended for large high-power missions to Mars and beyond. While the main goal for VASIMR is for manned Mars missions, it also can be used for big robotic missions and be put to civilian use in commercial passenger spacecraft.

"Our device is a prototype for the midcourse sustainer engines for this type mission," Bering said. "VASIMR is a plasma rocket as opposed to an ion engine. That means it uses a neutral but ionized gas as propellant. Ion engines generate thrust with a charged stream of positive ions."

A high-power, radio frequency driven magnetoplasma rocket, VASIMR's physics and engineering have been under study since 1980. The multifaceted research surrounding it involves theory, experimentation, engineering design, mission analysis and technology development. The paper reviewed the plasma diagnostic results obtained from 2002 to 2004 in a continuing series of performance optimization and design development studies, as well as outlined a plan and strategies for continued research.

Titled "Velocity Phase Space Studies of Ion Dynamics in the VASIMR Engine," the paper was named the 2004 American Institute of Aeronautics and Astronautics (AIAA) Best Paper for its technical and scientific excellence by the AIAA Plasmadynamics and Lasers Technical Committee. Held in conjunction with the recent AIAA Fluid Dynamics Conference, the award ceremony honored Bering, a professor of physics and electrical and computer engineering, and Brukardt, a research assistant in physics, both at the University of Houston; Franklin Chang-Diaz, Jared Squire and Tim Glover, all of NASA Johnson Space Center; and Roger Bengtson, physics professor, from the University of Texas at Austin.

Source: [University of Houston](#)

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