

SPACE PROPULSION SYMPOSIUM (C4)  
New Missions Enabled by New Propulsion Technology and Systems (6)

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ELECTROSTATIC AB-RAMJET PROPULSION SYSTEM FOR INTERPLANETARY EXPLORATION

**Abstract**

A new electrostatic ramjet space engine is proposed and analyzed. The upper atmosphere (85 -1000 km) is extremely dense in ions (millions per cubic cm). The interplanetary medium contains positive protons from the solar wind. A charged ball collects the ions (protons) from the surrounding area and a special electric engine accelerates the ions to achieve thrust or decelerates the ions to achieve drag. The thrust may have a magnitude of several Newtons. If the ions are decelerated, the engine produces a drag and generates electrical energy. The theory of the new engine is developed. It is shown that the proposed engine driven by a solar battery (or other energy source) can not only support satellites in their orbit for a very long time but can also work as a launcher of space apparatus. The latter capability includes launch to high orbit, to the Moon, to far space, or to the Earth's atmosphere (as a return Thruster for space apparatus or as a killer of space debris). The proposed ramjet is very useful in interplanetary trips to far planets because it can simultaneously produce thrust or drag and large electric energy using the solar wind. Two scenarios, launch into the upper Earth atmosphere and an interplanetary trip, are simulated and the results illustrate the excellent possibilities of the new concept.