SPACE PROPULSION SYMPOSIUM (C4)
Interactive Presentations (IP)

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FAST TRANSIT ACCESS TO THE OUTER SOLAR SYSTEM

Abstract

We explore the capability of a VASIMR reusable probe "catapult" concept to send a 4000-5000 kg spacecraft to Jupiter on a Hohmann-like transfer orbit, arriving in just 36 months elapsed time. The VASIMR performs a slingshot pass close to the Sun and uses the high level of available solar energy to produce a sustained burst of high thrust. Enough kinetic energy is provided to the probe to reach Jupiter orbit within 0.7-1.4 AU. The Catapult release the probe with enough speed to reach Jupiter in three years, and returns to Earth for another mission. This study identifies the important parameters in the probe ejector operation (power level, propellant mass, payload release point, distance of closest approach to the Sun), and scan these parameters to understand and optimize the capabilities of the proposed system. We assume that the Catapult and its payload begin at the Earth's sphere of influence (SOI), and are coasting in the Earth's orbit about the Sun. The VASIMR engine's power rating must match the peak power available when the spacecraft is closest to the Sun. The solar array is assumed to be a planar array rather than a concentrator since it will have to operate near the Sun, where a concentrator would overheat photovoltaic cells. The feasibility of not releasing the payload and using the VASIMR® to provide thrust for the duration of the transfer orbit will also be examined. In this scenario, the VASIMR RF generators could serve double duty as radar RF sources.