

SPACE PROPULSION SYMPOSIUM (C4)
Advanced Propulsion Systems (8)

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THOUSAND ASTRONOMICAL UNIT (TAU) LASER SAIL

Abstract

Laser pushed light sail, a type of Beam powered propulsion system with the advantage of propellant less travel is the technology of interest for the interstellar missions. With various propulsion system been developed, the major problem is the mass ratio of the spacecraft which is mostly influenced by the amount of fuel carried for the mission which in turn limits the duration and speed of the spacecraft. A Light/Laser sail propulsion is nothing but propulsion of the spacecraft with the help of laser. With the development of CubeSat technology, these can be used for deep space exploration. This paper is about combining both the technologies to reach 1000 Astronomical Unit (AU) in less than 50 years. Laser sail propulsion will have two parts, the sail and the laser transmitter. The sail will be dispatched from the CubeSat and the laser transmitter will be placed between Venus and Earth. The input for the production of laser will be the solar energy. The sail material will be a dielectric material which can withstand high temperature and has high reflectivity which is essential for laser propulsion and to cross the heliosphere to enter the interstellar space. Placing of transmitter near Earth will enable easy maintenance and monitoring of it. A hyperbolic trajectory has been calculated along which the CubeSat will be propelled by the laser to reach 1000AU. The laser intensity required and efficiency will be calculated for the entire mission. Laser transmitter built will not only support this mission but also can be used for various interplanetary mission where a CubeSat can reach any destination within weeks of duration making space exploration more easier.