

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

Author: Mr. IOURI PIGULEVSKI
Switzerland, dltech.ch@gmail.com

LASER ABLATION PROPULSION FROM GROUND TO ORBIT NEAR-TERM DEVELOPMENT
PROSPECTS.

Abstract

Almost 45 years have passed since the pioneering paper on the laser ablation propulsion “Propulsion to orbit by ground-based lasers” by Arthur Kantorowitz was published in 1972. However, despite of the high expectations and long-lasting efforts of the excellent scientists in developing laser ablation propulsion, not a single project for launching a satellite to orbit by means of the laser ablation propulsion was ever attempted since. What are the reasons of having the laser ablation propulsion not being up to the bright expectations as to launching from ground to orbit so far? The proposed presentation is taking up the above question. State-of-the-art in the laser ablation propulsion is presented in the context of launching small satellites from ground to orbit. Laser propulsion system for ground-to-orbit launch is briefly described including its constituent parts: 1) the high power laser beam source; 2) the ground-based optical telescopic emitter-receiver with the laser beam guidance system capable of tracking a spacecraft and pointing the laser beam at it; 3) the spacecraft equipped with the laser propulsion engine and the optical laser beam receiver system. TRLs pertinent to each constituent part of the laser propulsion system are evaluated. Critical issues of such a laser propulsion system practical realization are isolated. It is shown that, while a lot of RD is required to be done on each and every element of the laser propulsion system, the most critical part - a 1MW class average power laser - so far was and remains unavailable, which circumstance blocks the overall progress in practical realization of the laser propulsion system for launching from ground to orbit completely. The best available laser technology for resolving the unfortunate circumstance is suggested for development. The near-term prospects of such a development are outlined.