

SPACE PROPULSION SYMPOSIUM (C4)
Advanced Propulsion: "Non Electric Non Chemical" (8)

Author: Dr. Zhen He

College of Aerospace and Materials Engineering, National University of Defense Technology, China,
hezhen_2012@sina.com

Dr. Jianjun Wu

National University of Defense Technology, China, jjwu@nudt.edu.cn

Mr. Daixian Zhang

College of Aerospace Science and Engineering, National University of Defense Technology, China,
zhangdaixian@163.com

TRAJECTORY OPTIMIZATION OF GROUND BASED LASER LAUNCH FOR TWO LAUNCH
SCHEMES

Abstract

Ground-to-orbit launch with single ground-based laser was studied comprehensively. A model of beam transmission was set up considering the effects of beam extinction and spread. Models for laser propelled launch vehicle's flight process were developed based on the characteristics of vehicle and launch schemes. Trajectory optimization was performed for two kinds of ground-based laser launch schemes. Schemes 1 uses a laser at the peak of 3km altitude and the vehicle takes off from the peak. scheme 2 uses an airship at 30km altitude as the beam relay station and launch platform. Both flight simulations show the payload ratio of laser propulsion is much bigger than that of traditional launch vehicle. Flight simulations show that schemes 2 is better than scheme 1 for improving the performance of laser launch.