Paper ID: 44659
student

IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Interactive Presentations - IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (IP)

Author: Dr. Lin Ma
Zhejiang University, China, lma@zju.edu.cn

Dr. Kexin Wang
Zhejiang University, China, kxwang@zju.edu.cn
Prof. Zuhua Xu
Zhejiang University, China, zhxu@zju.edu.cn
Prof.Dr. Zhijiang SHAO
Zhejiang University, China, szj@zju.edu.cn
Prof. Zhengyu Song
China Academy of Launch Vehicle Technology (CALT), China, zycalt12@sina.com

TRAJECTORY OPTIMIZATION FOR POWERED DESCENT AND LANDING OF REUSABLE ROCKETS WITH RESTARTABLE ENGINES

Abstract

Reusable rockets will begin a new era in spaceflight, and the scheme of vertical takeoff and landing has become a promising way to recover rockets. This study presents a direct trajectory optimization framework for powered descent and landing of reusable rockets with restartable engines. The rocket engine is throttleable, but the number of engine restart is limited. Given the engine characteristics, a unified problem formulation with a multi-phase structure is established. The simultaneous collocation is utilized to transcribe the established problem into a nonlinear programming problem solved by interior-point optimizer. An initialization strategy is designed in the proposed framework to generate a good guess of initial value for the trajectory optimization problem. Simulation results illustrate that the presented direct trajectory optimization framework exhibits unification and adaptability to effectively deal with trajectory optimization problems of reusable rockets with limitedly restartable engines.