

SPACE PROPULSION SYMPOSIUM (C4)
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Author: Dr. Tao Chen
Beihang University, China, keda364993478@gmail.com

Prof. Jiawen Li
Beihang University, China, lijiawen@buaa.edu.cn
Prof. Ping Jin
Beihang University, China, jinpingsa@buaa.edu.cn
Prof. Guobiao Cai
Beihang University, China, cgb@buaa.edu.cn

REUSABLE ROCKET ENGINE SYSTEM DESIGN AND OPTIMIZATION

Abstract

The most important requirement for RLV and the most challenging element is the development and certification of high reliability, high performance, low maintenance, and low cost reusable rocket engines (RRE). For a RRE which is designed to perform given flight tasks, evolutionary method should be employed in system design to consider the requirement from related disciplines. Unlike the expendable engine, life, reliability and maintainability should also be weighted equivalently with performance, structure mass as well as life-cycle-cost. In this paper, additional models are developed to match the gap and then incorporated into the design process. Multidisciplinary optimization environment is set up to support the analysis. A model cryogenic-propellant engine using liquid oxygen and hydrogen with 50 design cycles (200s per mission) is studied to determine the Pareto frontier and the optimal compromise system parameters are obtained.