

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Future Space Transportation Systems (4)

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A REUSABLE SPACE LAUNCH VEHICLE SCHEME WITH AIRBREATHING PROPULSION
SYSTEM

Abstract

Reusable space launch vehicle is a developing trend of future space transportation system and the related technologies are investigated in aerospace industries around world from sixties of last century. Based on parameters' analysis and concept researches of several possible space transportation ways with various engines, a Two Stage to Orbit (TSTO) space launch vehicle configuration with Rocket Based Combined Cycle (RBCC) system as a possible selection was constructed and trajectories including climbing, stage separation, to orbit, de-orbit, and returning of first stage and second stage to ground were simulated. The research results show that a payload about two percent of gross take off weight (GTOW) can be delivered to the orbit and thus the reusable space launch vehicle scheme is a feasible one. Besides, influences of separation speeds, performances of engine, fuel types, et al on the vehicle's gross take off weight (GTOW), mass to orbit, and so on were analyzed. Key breakthroughs required to implement the reusable space launch vehicle concepts are discussed and their progresses are analyzed. Considering the advantages such as reusability, launch cost, flight safety and reliability, it would be a prosperous way from earth to orbit in the coming years.