

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
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SPACE TRANSPORTATION PROPULSION STUDY FOR FUTURE APPLICATIONS AT JAXA

Abstract

Feasibility study on future launch / high-speed transportation vehicle (termed as reference system) is undergoing at Japan Aerospace Exploration Agency, setting the target on reusable, manned launch vehicles. Two staged vehicle configuration to low earth orbit is the final target of the current study, while point-to-point high-speed transportation using the same vehicles is also under consideration for near-term application. For short-range (range about 2000 km) transportation, system study of a rocket engine powered vehicle is undergoing on aerodynamics, structure / weight, propulsion, and TPS. This vehicle will be used with modifications for the second stage (termed as orbiter) of the TSTO-RLV. For long-range (range about 10000 km) transportation, system study of a RBCC (Rocket Based Combined Cycle) engine powered vehicle is undergoing especially on propulsion, because a very high specific impulse is necessary to make dry-weight to take-off weight ratio reasonable. This vehicle will be used for first stage (termed as booster) of the TSTO-RLV. Ethanol was selected as prime fuel target both for economical and ecological reasons, as well as its easy -to-handle characteristics. System performance as well as the component feasibility (engine cooling capability etc.) was evaluated to find that single stage operation of these vehicles for the high-speed transportation would not be feasible to attain the target down-range, so that staged operation for the transportation was also assessed. All results from the system analysis on the orbiter vehicle as well as the combined TSTO vehicle will be reported in the presentation. Another approach is a study and demonstration of a reusable rocket engine with long life elements such as combustor, bearings and seals for turbopumps. This study also includes maintenance and health monitoring system for the engine.