

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)  
Technologies for Future Space Transportation Systems (5)

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## FLIGHT PATH DESIGN OF A REUSABLE ROCKET FLIGHT DEMONSTRATOR

**Abstract**

A reusable sounding rocket has been studied continuously since 1980s at the ISAS/JAXA. This vehicle adopts single stage and VTVL(vertical takeoff and vertical landing) . To reuse the vehicle, there is the issue that the vehicle has to ensure compatibility between the competent launch ability and returning flight which needs a large amount of propellant. To resolve this issue, this rocket is decelerated by aerodynamic resistance and turn over for vertical landing in return phase. After that, the vehicle is decelerated by the main engine for soft-landing. This returning flight system could make the propellant consumption of returning flight shorter. Since 2016, The flight demonstrator has been developed at the ISAS/JAXA to verify a series of returning flight. This paper focuses on the flight path of it. It shows design policy or constraint condition of the path and the result of analysis.