

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

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THE STUDY OF RETURNING FLIGHT AND LANDING FOR A REUSABLE SOUNDING ROCKET

**Abstract**

A fully reusable sounding rocket is proposed in ISAS/JAXA. This vehicle adopts single stage and VTVL(vertical takeoff and vertical landing) . The vehicle 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. To return the vehicle, there is a problem that the study of the guidance control method and securing both the launch ability and the propellant for soft-landing in addition to the ability required of conventional vehicle. It is necessary to design the airframe shape and control method after studying the motion characteristics at the time of return to clear these problems. This paper shows the result of motion analysis about the return system under consideration, and considers from the point of view of the vehicle specifications and control system. And it indicates the guidelines of the airframe and control system that is suitable for the return of reusable sounding rocket.