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

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CONCEPT AND SYSTEM DESIGN OF REUSABLE SOUNDING ROCKET

Abstract

At ISAS/JAXA, we have various space flight tools such as scientific satellites and planetary probe, various launchers including sounding rockets, and sratospheric balloons. In relatively small size of the flight program such as sounding rockets and balloons, we have been conducting both studies using these flight opportunities such as scientific observations, utilization of micro-G environment and so on, and the technical innovations of the vehicle themselves such as new vehicle and flight tool's development. In these small vehicle activities, it is easy to conduct new technology demonstration and technical challenges for the future applications. making use of these study environment at ISAS, a preliminary system design study of a reusable sounding rocket vehicle is underway. A goal of the proposed vehicle is first to achieve the fully reusable vehicle with enhanced operability, which will demonstrate the benefit of reusability as presented. At the same time, the rocket vehicle is used as a sounding rocket. An easy access to the flight opportunity is quite important for those who wish to use it such as the astrophysicist and researchers of atmosphere. The micro-gravity community is also one of the major potential users of the vehicle. By enhancing the flight operability, a low cost operation of the vehicle will give a good opportunity for these researchers or users, which means the frequent use of the vehicle is expected. Since the development of the orbital vehicle is a huge business, starting from a small but good reusability vehicle would be one of the effective ways toward the final goal of us, and the flight opportunity by the vehicle would potentially be beneficial to users. These are the background ideas for the present study. In addition, new technologies necessary for the future vehicle, such as an altitude compensation nozzle and new materials, will require an in-flight performance demonstration, because it is very difficult to qualify these new capabilities by the ground based facilities. Thus the proposed vehicle will be also beneficial to these technical studies.