SPACE EXPLORATION SYMPOSIUM (A3)
Moon Exploration – Part 2 (2B)

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DEVELOPMENT OF ROVER DEPLOYMENT SYSTEM FOR LUNAR LANDING MISSION

Abstract

The Japan Aerospace Exploration Agency (JAXA) plans a lunar exploration missions that includes a lander and rover for the early 2020s. In this mission, in-situ scientific investigations will be conducted on the lunar surface/subsurface and various robotics technologies (e.g., landing, mobility, and sensing) will be demonstrated under the harsh environment. At the begging of the mission, a rover carrying spacecraft lands on the lunar surface and the rover leaves its mother ship for a further exploration. To safely let the rover start on its journey, a rover deployment system is essential and has been under development in our research group. Although the deployment system must be reliable and strong enough for the rover, it should be as lightweight as possible and stored compact when launched. Based on these requirements, we study ramp-type systems as the candidate. For the ramp development, design concept study and structural analysis were first conducted. Subsequently, ramp deployment and rover release tests were performed using the developed ramp prototypes. Through these tests, the validity of their design concepts and functions were confirmed. In the rover release test, it was observed that the developed lightweight ramp is strong enough for a 50-kg rover to drive down. This result suggests that this ramp system could be used for a deployment of a 300-kg-class rover on the Moon where the gravity is about 1/6 of that on Earth. A lightweight ramp developed in this study will contribute not only to a safe rover deployment but also an increase of lander payload. In this presentation, a present status of the deployment system development is explained in detail.