

MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Space Structures 1 - Development and Verification (Space Vehicles and Components) (1)

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DEVELOPMENT OF A STRUCTURAL MODEL FOR KOREAN LUNAR EXPLORER

Abstract

This paper shows the development of a structural model for Korean lunar explorer. The Korean lunar explorer program is planned to develop two unmanned lightweight spacecrafts; lunar lander and orbiter. Explorer's bus structure should be designed to have light weight due to constraints from launcher as well as provide structural safety to endure launch load, in-orbit condition and landing condition and serve accommodation space for equipment to perform mission. Especially, in case of lander, design capability for landing gear is required to land safely on lunar regolith. In this study, the design, analysis and test for the structural model are performed for the demonstration of the lunar lander which will be launched by Korean launch vehicle in early 2025 according to the national space development strategy. The main objective of developing lander structural model is to verify the structural integrity of the bus structure under landing impact and to obtain a design technology of landing gear such as impact absorbers, landing dynamics. The lunar lander will be developed based on the experiences and technologies acquired from the structural model. One of the most important factors in the design of lander demonstrator structure is weight reduction due to tight mass requirement. Thus, truss type design applies to the bus structure and light materials such as CFRP sandwich panels with aluminum honeycomb core are selected. The design requirements of the structure are obtained from system operational condition. In order to meet the requirements of the structural model, stress analysis and landing dynamic analysis are performed. In addition, the drop tests for the landing gear are performed to verify the structural integrity and the function of landing gear such as impact absorbability.