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LUNAR TRANSPORTATION MODULE USING EXTRATERRESTRIAL RESOURCES

Abstract

Within the development of space activities beyond low Earth orbits a significant reduction of the transportation operations cost may be ensured by extraterrestrial resources application as reaction mass, the first source of which will be the Lunar surface. Thus the first space transportation object to be refueled with extraterrestrial propellant most likely shall be Lunar Transportation Module (LTM). This LTM will be able to provide cargo and passenger transportation at the "the Moon orbit - the surface of the Moon" section.

The usage of propellant produced at the lunar surface from the local resources imposes certain requirements and restrictions on such transportation module. Also, LTM creation and putting into operation should be integrated into particular lunar activity development program as well as into planned lunar infrastructure with LTM operation optimization focused on economic efficiency raising.

The present article demonstrated LTM design and its main technical systems composition. Reusable propulsion system shall use oxygen-hydrogen propellant, produced from the lunar resources, while the transportation module itself shall be able to deliver automatically various cargoes, including manned modules, from the near-lunar station to the lunar surface and back. A number of principal scenarios for LTM application were also elaborated, including delivery of propellant, produced at the Moon, to the near-lunar station to refuel various space objects and to support far space exploration missions. The article also provides a phased program for reusable LTM creation starting with its single-use prototype as well as further prospects for this concept development.