

IAF SPACE EXPLORATION SYMPOSIUM (A3)
Interactive Presentations - IAF SPACE EXPLORATION SYMPOSIUM (IP)

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LUNAR LANDING-AND-TAKEOFF VEHICLE

Abstract

In the first phase of lunar surface investigation, the topical problem is collection of maximal volume of information from different areas of lunar surface, which requires either several missions, or creation of a long-range mobile laboratory, which is rather costly in both cases. For effective and cost-efficient solution of this problem, Yuzhnoye SDO proposes to use a new type of mobile laboratory – lander-hopper capable after landing of flying to a new place of investigations. An analysis of problems to be solved and flight operations of the lunar lander-hopper, its possible configuration and peculiarities of mission has been made. The design, main systems and their functioning have been developed, the technologies and costs required for vehicle creation have been determined. Selection of the design and components has been determined by way of rational combination of existing and newly developed technologies and use of current and planned capabilities of Ukrainian and international cooperation, experimental production facilities of Yuzhnoye SDO and developing test base. For lander launching, a commercially available ILV can be used, in this case, the vehicle performs a considerable part of flight to the Moon using own propellant reserve. The lander's propellant reserve that remains after soft landing on the Moon allows making several flights with analysis of different points of lunar surface or a flight to the range difficult-to-access for the surface mobile laboratories, particularly, increasing the active lifetime owing to the flight from the nightside of the Moon to the dayside. As further development of the concept, the lander version is considered capable after landing of returning into near-lunar orbit with ground samples and as required, of refueling from orbital resources and performing multiple missions. The paper shows the configuration of flitting lunar lander, its main systems and components, technical characteristics and power capabilities, applied technologies and possible options of cooperation in vehicle creation. The evaluation has been made of costs and terms of vehicle development and of a whole set of its tasks and capabilities allowing performing a comprehensive investigation of lunar surface at several landing points during one mission.