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SPACE TRANSPORTATION VEHICLES FOR CARGO DELIVERY TO THE ORBITS OF SMALL CELESTIAL BODIES

Abstract

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At present time the scope of functions to be solved through the achievements of rocket and space technology is constantly growing. Each year more than a hundred objects for various purposes are injected into space. At the same time active studies in the field of development of reusable space transportation systems has recently been conducted that in the long term will allow reducing the payload delivery cost.

In this paper as space transportation vehicle for cargo delivery to the orbits of small celestial bodies it is proposed to develop a special transportation spacecraft designed for reusable delivery of payloads from the Earth orbit to target orbits. In comparison with the available typical upper stages the specific feature of such a spacecraft is its versatility related to both: payloads to carry and launch vehicles aimed at delivering of payloads to a low orbit, as well as its self–sufficiency (i.e. availability of own service systems: navigation, control, thermal regulation, power supply, etc.).

Today there are no pure operational reusable interorbital transfer vehicles. Therefore the upper stages Fregat, Breeze, DM and KVTK similar in design and purpose were analyzed, and based on this analysis an interorbital reusable vehicle was designed, including selection of the type of propulsion system and required propellant, as well as mission profile and possible layouts were proposed.

Such a reusable spacecraft for multiple delivery of payload from the Earth orbit to the orbits of small celestial bodies or Moon orbit will result in cost reduction of space transportation missions.