

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Heavy lift launchers capabilities and new missions (8)

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PROSPECTS IN DEVELOPMENT OF HEAVY-LIFT LAUNCH VEHICLE ORBITERS FOR DISTANT
SPACE MISSIONS

Abstract

Currently, the issue of development of orbiters for heavy-lift launch vehicles, providing long-time space flight missions, is very urgent. The development of such orbiters will allow us to make progress in realization of manned missions to the Solar System planets, protection of the Earth against the collision with asteroids, cleaning of near-Earth space from anthropogenic space debris, etc.

The ground for a potential possibility to develop orbiters, powered flight time of which is many times higher than that of existing spacecraft, is the progress in designing of flight nuclear reactors as well as drivers using the effects of interaction with environmental magnetic fields. The Russian Federation has started to develop a propulsion system that cardinally stands out for a flight closed-cycle nuclear reactor, radioactive environmental action of which is eliminated; working medium of engines and plume are not radioactive.

This report presents versions of technical aspect of orbiters, consisting of propulsion systems (including those having nuclear reactor), electric-ion engines, and drivers that use the effect of interaction with environmental magnetic field. Characteristics of new orbiters are compared with those of the designs that are well known from materials of conferences and scientific publications.

Examples of integration of new orbiters with a launch vehicle structure as a whole are given. Alternative orbits for long-term space missions, during which various engines and drivers operate in turn, are demonstrated. For example, start and shutdown of drivers that use the effect of interaction with environmental magnetic field, depending on a flight course, can significantly effect on the required flight reserve of working medium.