

UDC 689.785

SPACE TRANSPORT NETWORK DEVELOPMENT PROJECT

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The placement of various stations in high orbits, on objects of near and far space, such as Moon, Mars, the satellites of Jupiter and Saturn, etc., largely depends on the efficiency of the space transport system that delivers structural elements, scientific laboratories, minerals, fuel, etc. to the orbit of operation or to stations located on objects of near and far space. Among the variants of transport spacecraft offered for these purposes, of particular interest are spacecraft with an electric rocket engine or, as they are called, spacecraft with low-thrust engines. In this paper, we propose the possibility of building a space transport network on spacecraft with low-thrust engines. The level of overloads occurring during the operation of such propulsion systems is low. Thus, it reduces the level of operational loads on the transported structure [1; 2].

Spacecraft with electric rocket engines require the use of power plants that provide significant electrical power.

As part of the nuclear power plant, there should be a space-based nuclear reactor and a system for converting the thermal energy released during nuclear fission into electrical energy. NPP should operate in such near-Earth orbits, for which the time of ballistic existence is guaranteed to be longer than the natural decline time of spent nuclear fuel accumulated radioactivity to a safe level. This requirement is met by orbits with a height of at least 800 meters...1500 km. In this case, the transport module-tug will run between its home orbit and the target high orbits, and cargo will be delivered to the home orbit from the Earth by vehicles operating on rocket fuel. The space transport network is built from several blocks. Cargo delivery from the point of departure to the point of delivery takes place at several stages. From the point of departure to the transport spacecraft, cargo must be delivered using the system of launching cargo into a close orbit. The launch system can be either, for example, a launch vehicle, as well as a descent system. Then, in near-Earth orbit, cargo is transferred from the launch system to the transport spacecraft, for subsequent transportation.

The use of low-thrust engines increases the delivery time of cargo. So, the use of such spacecraft is possible only when building a system. A system of 5-10 spacecrafts will be able to provide an efficient and reliable supply of cargo.

References

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2. Kulandin A.A., Timashev S.V., Atamasov-L V.D. Fundamentals of theory, design and operation of space nuclear power plants. Energoatomizdat, 1987. 328 p.