

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Future Space Transportation Systems Technologies (5)

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CONCEPT OF MULTIPURPOSE ELECTROJET SPACE TUG CREATION

Abstract

On the background of new trends in human exploration of space necessity arises in creation of multipurpose systems allowing longtime maneuvering in space and executing various functions. For solving such tasks high efficiency of propulsion systems is needed. Unfortunately, traditional propulsion systems on chemical propellants are not enough suitable for the longtime maneuvering as they have comparatively low specific impulse and therefore require big propellants stores. Interest of using electrojet propulsion systems having high specific impulse has been considerably increased recently. However, low thrust of electrojet engines (about several grams) leads to long duration of maneuvers. New achievements show possibility of essential increasing electrojet engines thrust (up to several hundred grams) that will give possibility to efficiently execute space missions. Considered in this report is possibility of creation of the electrojet space tug intended for delivery of payloads to working orbits at executing various tasks like the following: • multiple transition of satellites from a low Earth orbit to high energy orbits (geosynchronous orbits, geosynchronous transfer orbits, escape orbits etc.); • extension of lifetime of a geosynchronous satellite at the expense of its keeping in the needed orbital point after propellant exhausting; • space debris removal; • payloads delivery to Lagrange points; • interplanetary missions; • inspections of satellites; • use as a platform for satellites and automatic interplanetary stations. Base systems of the electrojet space tug are described, and results of design ballistic studies of effectiveness of the tug with selected propulsion systems at injection of payloads to geosynchronous and geosynchronous transfer orbits are presented in the report. It is shown that implementation of this project is possible by Ukrainian enterprises.