Space Transportation (6)
Space Transportation (1) (1)

Author: Mr. Dmitry Novoseltsev
Russian Federation

DEVELOPMENT AND PROSPECTS OF THE D-START SIMPLEST PULSE ENGINES FOR SINGLE-PULSE MANEUVERS OF ULTRALIGHT FEMTO-CLASS SPACECRAFTS WITH EXTERNAL ENERGY SOURCES (INCLUDING THE POSSIBILITY OF USING SPACE DEBRIS)

Abstract

Design and production of the lower part of the line of ultra-small spacecrafts with a unit mass of 100 g or less (Femto-classes), including non-hull spacecrafts "on board" (ChipSats), opens up opportunities for significantly more cost-effective solutions to most problems of space research. The main problem that limits the scope of application of ultra-small spacecrafts is the lack of propulsion systems that allow them to perform independent maneuvers. D-Start LLC (-) was founded on 25.06.2020 to implement a project to development a family of engines for ultra-small Femto-class spacecrafts and related technical solutions. The basic technology of the project is described. In 2021, flight tests of some technical solutions and the ground testing program for a number of structural elements, including the "Impulse" tests of the operated model of the simplest engine on the real AmbaSat-1 femtosatellite, as well as experiments "Impulse-0", "Fireworks", "Origami" on modeling a number of technical solutions in flight conditions are planned. The technologies are aimed at a wide sector of developers and users of ultra-small Femto-class (gramm-scale) spacecrafts, including legal entities and individuals (B2B and B2C), research and educational organizations, and independent researchers. One of the technologies being developed will reduce the mass and cost of individual femtosatellites by an order of magnitude relative to the ChipSat format. In the future, the technology will allow the use of both man-made space debris and waste from the processing of space mineral raw materials, as well as laser or concentrated solar radiation, as a source of energy for engines, while maintaining the design and technical solutions of the engines.