

Space Stations (9)
Space Stations (2) (2)

Author: Ms. Veronika Pavlyuchenko
Bauman Moscow State Technical University, Russian Federation, www.cereal_girl@mail.ru

Mr. Mike Denisov
Bauman Moscow State Technical University, Russian Federation, mikdenisov@gmail.com
Ms. Polina Kotlovskih
Bauman Moscow State Technical University, Russian Federation, www.ffff@mail.ru

DEVELOPMENT OF AUTOROTATIVE LANDER FOR SMALL SCIENTIFIC PAYLOAD DELIVERY FROM ISS

Abstract

The paper discusses the development of a small lander and development of a technology for its descent using the autorotation effect for braking in the atmosphere. The tasks that need to be solved in the process of designing and constructing the apparatus are determined. The primary layout of the test probe was developed, aerodynamic calculations were carried out for several options for the shape of the descent capsule. The main goal that seems possible to achieve by using the apparatus developed in this project is to organize the delivery of small scientific cargo from the orbit of the Earth to the desired point with minimal financial costs.

Projects of descent vehicles using autorotation were actively considered and investigated both in the 1960s and in our time. However, at the moment there is no such a vehicle in active use. Compared to the projects offered by Russian and foreign companies, this project is distinguished by the fact that it was originally intended for a small payload in terms of mass and size, and can also be used as a capsule for student MCAs. The closest realized analogues of the apparatus proposed by the authors according to the type of lander and the composition of the payload can be considered the capsule "Raduga" (payload - 150 kg.) and the Japanese capsule mounted on the Kounotori 7 space truck (for delivering protein crystals and other experimental results to Earth).

The main advantage of the apparatus under development is its autonomy: the proposed lander can be delivered to the orbital station, for example, using the "Progress", can return cargo from orbit at any time, which will allow the timed delivery of important cargo, for example protein crystals; Thus, the prompt delivery of experimental samples and other cargoes to Earth will make experiments in space more informative with the operational processing of the results of experiments on Earth.

For the initial verification of the use of the autorotation effect on small descent vehicles and the development of technical solutions, it is proposed to create a stratospheric apparatus with a payload in the form of scientific equipment for telemetry transmission during the descent of the apparatus itself, as well as with a deployable braking system using a propeller.