ABSTRACT

The task motion of the spacecraft in the atmosphere is a complex and very important to carry out the planned mission. For the design of such a mission it has developed a special technology for the descent of the spacecraft in the atmosphere of the planet. This technology is based on the concept of using inflatable braking devices. The use of such inflatable braking devices can reduce high values of speed at the beginning of the movement of the landing vehicle to small values of acceptable rate at the end of the movement.

This technology was originally developed for landing in conditions of Mars. The ultimate goal of this project - to assess the possibility and the advantage of this technology for use in a descent into the Earth's atmosphere to deliver payloads of small size with low-Earth orbits at relatively low cost. The main objective of this project is to evaluate and develop a conceptual design of a descent system for the appropriate mode range in the Earth's atmosphere. It is expected that there may be additional perturbations of the Earth's atmosphere during the entry, descent and landing.

As a result of our studies, we can make conclusions about the effect of asymmetry external form of inflatable braking devices on the stability of the landing vehicle. The asymmetry of the external form of braking device in its deformation can lead to significant values of the coefficient of aerodynamic asymmetry. This in turn causes a change in the dynamics of angular motion of the landing vehicle. It is necessary to avoid the occurrence of such modes of motion of the landing vehicle.

The preliminary results reveal a very good perspective, showing that the current design for the Mars lander can be used for the Earth. Research carried out for the dynamics of movement of many different types of entry and descent conditions in the Earth's atmosphere. Analysis of existing technologies and modern trends show that the technology using inflatable brake Arrane studied in this project RITD have a high potential for further applications. Considered technology can be applied to deliver the payload into the Earth's atmosphere.

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