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ABOUT THE FORMATION OF UNMANNED SMALL SPACE REENTRY VEHICLES

Abstract

For the last years, designing small-sized spacecraft's has been one of the most promising lines of development in the space industry. An important feature of spacecraft platforms created nowadays in Russian is their versatility, which is characterized by their ability to be adapted to a wide range of tasks. As part of the Russian Federal Space Program, NPO Lavochkin Association, for the period 2013 to 2026 aims to put into operation a large number of spacecraft's that includes small satellites for planetary and fundamental researches.

One of the main tasks in the worldwide space program is the planetary research including Mars, Venus and Earth exploration. Returning to Earth experiments and production of micro-gravity and other space technologies is not always convenient and not economically doable, particularly when loads are small. Developing and exploiting small unmanned reentry capsules give us a way to solve these problems, by using the advantages of small spacecraft's as design of low cost means; price attractiveness of manufacture and launch into space; possibility of launching clusters of reentry vehicles; long life time and reliability; etc.

Following this motivation, it's considered the possibility of using the developmental heritage for Mars and Venus missions, in order to develop a universal, modular platform for a small unmanned space reentry vehicle, based on the development line on small spacecraft's of NPO Lavochkin. The main tasks for this platform include fundamental space research, testing and demonstration of new technologies, flight testing of new structural elements or devices, study of planets and interplanetary space, delivery of samples from other planets to Earth.

When creating a platform should be use a set of constructive principles corresponding to the world trends in this area. Among these principles includes modularity, unification and standardization, versatility and flexibility, modernity.

The methodological approaching proposed should provide a possibility of reducing the time of mission design and in some cases costs; the ability to use the small reentry vehicle for solving different problems in the presence of light standardized platform and modular design for the payload; a relative simplicity of design; high reliability; the possibility to be launched on different types of launch vehicles as a primary or associated payload.