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ОСНОВНЫЕ ПРОБЛЕМЫ КОСМОНАВТИКИ

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Космонавтика – отрасль высоких технологий, двигатель мирового прогресса, однако развитие космонавтики породило ряд проблем, как для самой отрасли, так и для человечества в целом. В данной работе будут рассмотрены такие важные проблемы, как спутники связи и космический мусор, системы дистанционного зондирования и сложности космической колонизации.

Ключевые слова: Космонавтика, ГЛОНАСС, спутники, колонизация, зондирование, орбита, космический мусор, последствия, перспективы.

MAJOR PROBLEMS OF COSMONAUTICS

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Cosmonautics is a high-tech industry, the mover of world progress, but the development of cosmonautics caused a number of problems, both for the industry itself and for humanity as a whole. In this paper such important issues as communication satellites and space debris, remote sensing systems and complexity of space colonization are considered.

Keywords: cosmonautics, GLONASS, satellites, colonization, remote sensing, orbit, space debris, consequences, prospects.

Today cosmonautics is a high–tech sector of science and production. But it has a number of problems, which will be dealt with in this paper. Also it is important to determine possible consequences and perspectives of solution of these problems.

The problem of communication systems troubles can be considered one of the most actual. Nowadays a lot of countries have their own governmental communication satellites. At this moment, there are already more than 1200 various objects on the Earth's orbit. About 90 % of them are placed in a geostationary orbit, which is the same for the majority of working satellites. Thus, the international struggle for necessary space in the orbit is inevitable. With the same intensity of sending satellites to the Earth orbit the useful space in the orbit will end for the next 15–20 years. The situation is aggravated by a lot of space debris in the orbit. Such debris includes, for example, the oldest satellite "Avangard-1" which has been in orbit since 1957, and according to some estimates it will stay there for about 240 years.

The creation of heavy multi–purpose satellite platforms capable of performing a wide range of tasks could be the solution to this problem. Such a platform will be able to replace several satellites, while maintaining their functionality, winning in size and cost in comparison with sending several satellites into orbit. These projects are currently being developed, for example, French platform "Spacebus", and platform series "Express" ISS named after M. F. Reshetnev based on their technology. This solution is very advantageous from a commercial point of view; the same platform will be useful for international cooperation, construction of transnational satellite projects.

Another problem is a number of issues with regards to the systems of Earth remote sensing (ERS). Some of those issues include: the lack of common standards for using data from various ERS systems,

countering of using such systems as reconnaissance weapon, dependence on the American GPS (Navstar GPS) and difficulties with access rights to the information obtained from ERS systems.

The above complications are closely interrelated. For example, modern remote sensing systems can take images with a resolution of up to 0.5–1 m, i. e. pictures of high precision, which makes the system an excellent reconnaissance weapon. Such a possibility immediately raises the question of access to information with ERS systems; in the "wrong" hands such information may cause significant damage to national security. In its turn the GPS system was created for the US military department, and as most systems are tied to GPS, in case of necessity it provides the United States with great opportunities.

The question of access rights to information from ERS systems is actively discussed.

To overcome the dependence on foreign analogues other ERS systems such as the Galileo (EU), GLONASS (Russia) and others are developed.

With regards to GLONASS it can be said that the functionality of the system is not inferior to GPS, the main problem for GLONASS is stability.

Stability falls largely because of the old satellites (ISS named after M. F. Reshetnev successfully resolves this issue), as well as due to the total number of satellites. By 2020, Roskosmos plans to upgrade the satellites, to bring the number up to 15–25 units and keep count at this level; there is a positive dynamics of the system development.

Difficulties with the space colonization can be considered another problem, as well as insufficient funding and reducing the interest of the scientific community.

The situation may change in the next 15–30 years, if scientific community will pay attention to space colonization. Space exploration will allow solving a number of Earth problems such as the problem of overpopulation and lack of energy. However, colonization is associated with some difficulties, such as:

1. Transformation of climate and landscape (terraforming).
2. Sun radiation.
3. Meteorite threat.
4. A large distance from the Earth.

The most likely places for colonization are Mars and the Moon, because they are closer to the Earth and there are fewer problems than on other space objects (Mercury, Venus, Europe, Saturn, Jupiter, and Uranus).

The problem was widely discussed beginning from the middle of the last century. During the "lunar race" projects of colonization of the Moon (the Soviet base "Star" and the American "Lunar Oasis") were created, today an international project «Mars One» is being discussed, according to which already in 2022 it is planned to send the first colonists to Mars.

In its turn the Russian Federation has its own lunar program, which consists of 3 phases:

1. 2016–2025 sending station Luna-25 – Luna 28 to explore the lunar surface, the composition of the soil and selection of the best home base
2. 2028–2030 manned expedition to the orbit of the Moon without landing on the surface
3. 2030–2040 landing of astronauts on the Moon, deployment of the base, construction of infrastructure.

However, today, space colonization seems to be more fantasy than reality. Cosmonautics needs changes and transformations. Only by revising the attitude to the industry Russia will be able to overcome any problems and return the status of an advanced space super state.

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