

BATTERIES OF THE SPACECRAFT

Rud A.A.

National Aviation University, Kyiv

Supervisor - A.K. Ablesimov, Cand. tech. sciences, prof.

The study and development of space requires the development and improvement of spacecraft for various purposes. In this case, it is economically feasible to increase the service life of the spacecraft.

The high level of reliability and quality of operation of onboard systems and equipment of spacecraft largely depend on the efficiency of their power supply systems. As practice shows, the primary source of energy in the energy supply system is the solar battery. It determines the period of active existence of the spacecraft. Failure of the solar battery leads to the gradual failure of the entire power supply system.

Solar panels are placed on the outer surface of the spacecraft or on the hard rigid panels. To maximize the energy given off, the perpendicular to the surface of the battery should be directed at the Sun with an accuracy of 10-15°. This allows you to get power up to 130 watts per square meter of solar cell surface. In the case of rigid panels, their orientation to the Sun is carried out by an autonomous electromechanical guidance system.

Analysis of the load (volt-ampere) characteristics of the solar battery showed that they are significantly nonlinear, and the volt-watt characteristic has a pronounced extremum. The position of the extremum and its level are determined by the operating conditions of the battery, which change:

- temperature fluctuations as a result of spacecraft maneuvers or its entry into the shadow of the planet;
- meteor erosion;
- radiation...

In order to optimize the operation of solar panels of the spacecraft, an extreme system of automatic regulation of their power is proposed. The method of synchronous detection is chosen as a method of finding the extremum. The system of extreme control is a system with control for the deviation from zero of the derivative of the adjustable coordinate of the control effect of the control object. A feature of the system is the presence of a test signal generator and a synchronous detector. The processes of search and maintenance of the optimal level of solar power by the system are considered.

References:

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