

SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)  
Space Navigation Systems and Services (4)

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THE SYSTEM OF SPACECRAFT'S ANGLE ORIENTATION

**Abstract**

The different types of the systems of angle orientation and stabilization are used in spacecraft, it depends on the way of use of spacecraft, its mass, necessary of accuracy, lifetime, limitation by energy.

In general the type of the system of angle orientation and stabilization is determined by the use of exact sensors and executive powers.

The typical systems are based on using of sun sensors, which can determinate two axis orientation of spacecraft; sensors of temperature of heat-sensitive plates, which can determinate three axis orientation (they use data about temperature field of plates); magnetometers, the accuracy of which is some part of degree; the systems of orientation which are based on use of received information of GPS receiver from three different antennas which are located on different lines (the size of the basis is very big in this case, it is apresentation to use this solution in microsattellites); star trackers (it is one of the most accuracy method of orientation, however it requires the retargeting apparatus, sensors of this types are very expensive); the sensors of inertial navigation and orientation (they lifetime is very much restricted).

A new method of spacecraft angle orientation based on use of lobe – switching method is proposed. As an emission source is another space object, which position data and angle attitude are known with high accuracy. Position data of spacecraft must be determined with high accuracy too, for example, it can be determined using the GPS receiver.

It will be possibility to determine the attitude of spacecraft by measure of lagging of receive signal comparative to the emission source if antenna with rotation diagram is installed on board of spacecraft. A received signal is not changed by the amplitude if it is located on boresight.

Therefore, the receive of signals from the several space object allows to determinate spatial orientation.

The exact information about accuracy position of spacecraft and space objects allows to possibility determinate approximately the attitude of spacecraft comparative space objects.

It is proposed to test this solution on one of university satellites.