UDC 004

JUSTIFICATION OF A CHOICE OF THE ORIENTATION SYSTEM OF THE NANOSATELLITE ENU-KZ

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The term "orientation" is widely used when you want to tell about the set angular movement of the satellite. There are active and passive systems of the orientation depending on what nature of operating action on angular movement of the satellite, what ways of its realization and what devices are required.

If creation of controlling actions needs an expense of a working body or the energy, reserved onboard, and if formation of these actions requires the logic block, sensors of the orientation and executive bodies, such system has the name of active orientation system.

The passive orientation systems using interaction with external fields of a natural origin, don't consume a working body and the energy reserved onboard of the satellite. Perhaps, only during the initial moment of time their short-term expense for reduction of the orientation system into position is required, for example to put forward bars, to turn a part of the satellite, etc.

First of all, it is necessary to choose functions which will be carried out by the satellite and then choose appropriate equipments. In our case first of all it is an exit to a circumterraneous orbit and to be stabilized in the direction to Earth after that he will observe a terrestrial surface. The mass of the developed nanosatellite ENU-KZ will be about 2-3 kgs. The stand consists of 2 parts: Sun and nanosatellite model. The model of the nanosatellite consists of gyroscopic elements such as:

- Board computer;
- Engine-flywheel;
- Simulator of the jet engine;
- Control system of executive elements;
- Supply board;

- Sensors.

The principle of their work, as we know, is based on preservation laws in the first case of the kinetic moment (the impulse moment), in the second number of movement impulse).

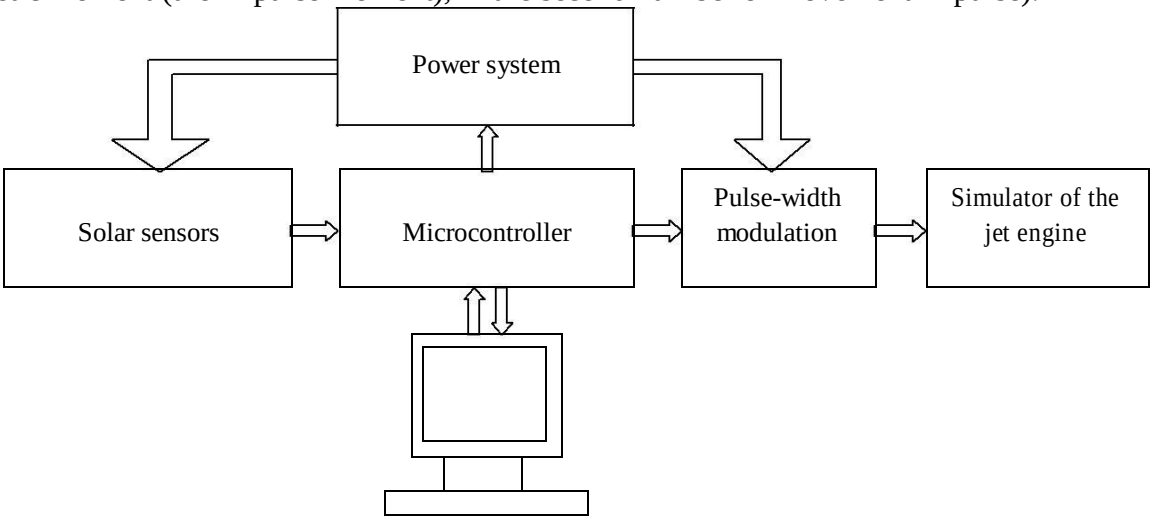

Fig.1. The nanosatellite model consisting of gyroscopic elements.

As the nanosatellite is oriented on the sun, it is obvious that as a part of the device the solar sensor will be one of the main elements. These sensors of the orientation system of the satellite allow to define location of the satellite by the sun and to orientate it in the necessary position. So, for example, an objective of the solar sensor should have a strong optical filter to lower energy stream on a matrix. The field of vision of the sensor should be as much as possible.

The board computer is the central element of the nanosatellite; it is "heart" of it. Conditions of a space make rigid demands to a choice board computer‘s elements. They should be steady against action of space radiation, work in a wide range of temperatures, have rather low power consumption. It uses the Atmel AVR ATMega8 microcontroller as the main processor which works with the setting quartz generator with frequency of 3.6864 MHz.

The computer choice for the model is dictated by the following requirements:

- Minimum dimensions and power consumption;
- Existence of interfaces of the type RS232, USB;
- Rather powerful processor and large volume of a disk;
- Availability in the domestic market, small cost;
- Lack of moving parts, such as fans of cooling and drives of hard disks;
- The most convenient, available system of development, debugging and implementation of programs.

The system of an energy supply is destined for development, storage, regulation and electric power distribution in all phases of operation of the satellite in an orbit.

The system of an energy supply consists of the following elements:

- Power source (panel of solar batteries).
- Storage batteries.
- Energy converters.
- Control system and control.

Solar batteries should feed device and charge storage batteries on light. Storage batteries have to provide with the electric power loading in Earth shadow. The energy received from solar batteries, should be sufficient for providing all elements of the satellite with the electric power and a charging of storage batteries when the satellite isn't in Earth shadow. It is necessary to protect elements of system of an energy supply against radiation and other space particles. It is also necessary to provide a demanded temperature range. There should be the priority system, allowing disconnecting noncritical subsystems of the satellite when level of energy became less than some