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Switching of gyroscope vibration

It is known that the gyro can have parasitic properties, especially in outer space. The topic of our research is switching of gyroscope vibration in space. It is a parasitic property of a gyroscope which determines the oscillation of the system when applying a short pulse. It can lead to the system uncaging. These fluctuations can occur during docking of satellites. It could be possible, for example, to use the phone to determine its position relative to the ground. But now in phones the accelerometers are used. They have no parasitic properties which strongly affect system alignment. But why not use the accelerometers in space? It is because of their feature: accelerometers require the gravity. In orbit it is problematic. This fact determines the relevance of our topic – the method of correcting the oscillations.

Therefore, the aim of our research is to study one of several possible ways to resolve the problem. It is a short pulse applied to the system of gyro engine immediately before and after docking. All this occurs in a certain time interval. During the study three tasks have been solved:

- The ways to get rid of switching ocscillations have been discovered.
- The theoretical length of the pulse has been determined.
- The experimental device for testing theoretical data has been prepared

It was found that when submitting a short time pulse with a time value equal to 22.2 milliseconds, nutation of oscillations can be avoided. In this regard, we have transgressed and practically verified the data. Before submitting short pulses, we needed to change the signal source. The analog signal has been changed into a digital signal. With this, the short pulse was the closest match to the value of 22.2 milliseconds. After installing the microprocessor, the operating parameters were set. Verification of the theoretical data was launched. In this regard, it has been experimentally confirmed that the method of our approach to solving the problems is associated with the commutation of oscillations. It has been experimentally proved that this method is efficient. But we all still can not say whether this method can work in space. The weight of the device will not be considered – so here will be no additional load on the system orientation. This is the last time to the change the pulse supplied, and the verification in zero gravity is required.

References

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