

Satellite Stabilization Methods

Satellite Stabilization methods are employed for the attitude control system that is necessary for the spacecraft in order to maintain the antenna pointed correctly towards the Earth's direction. Various methods are employed for the stabilization of satellite. This post includes Satellite Communication Notes on Methods of Satellite Stabilization explaining Spin Stabilization and Three Axis Body Stabilization in details. In order to control the attitude in space, the satellite has to be properly oriented using momentum wheels and thruster motors in these three axis. The two major methods used are as follow:

- Spin Stabilization
- Three axis body stabilization

Spin Stabilization

It is the most commonly used method and employed method where the entire spacecraft is rotated at 30 to 100 rotations per minutes. This spin provides a powerful gyroscopic action to maintain the spin axis in the correct direction. Such satellite consists of cylindrical drum covered by solar cells and the rocket motors.

The transponders is mounted on the top of the drum. It is driven by an electric motor in the appropriate direction to that of the drum, so that the antenna remain pointing towards the Earth. This opposite motion is called despun. The despun section is kept stationary by counter rotation provided is by small gas jets mounted on the periphery of the drum.

Three Axis Body Stabilization:

On the other hand, a satellite can rotate about the three axis terminals i.e; yaw, roll and pitch axis. When a satellite is stabilized about these axis then it is called as three axis body stabilization. In this method stability is achieved by mounting three momentum wheels on three mutually perpendicular axis.

A momentum wheel is a high speed wheel driven by the motor. It is kept in a sealed evacuated chamber. Increase in its speed increase in its speed increases the angular momentum. change in the attitude are transmitted to the earth station by telemarketing the data from the sensors. The data is analyzed and commands are sent to the satellite to increase or decrease the speed of the momentum wheels as per requirements to correct the attitude about its three axis:

- Roll axis (the orbital plane),
- Pitch axis (normal to the orbital plane) and
- Yaw axis (the local vertical plane facing the earth station).

Antenna are mounted on the satellite surface facing the earth.