The geometry of equilibria of orbital gyrostat

S.V. Chaikin [*]

Institute for Systems Dynamics and Control Theory of the Siberia Branch of RAS,
Irkutsk, Russia schaik@yandex.ru

The motion of stationary gyrostat is considered in the so called restricted formulation of problem [1]. The stationary gyrostat considered to be a rigid body with an isotropic axially symmetric rotor which rotates around its axis of symmetry fixed in a rigid body with a constant anqular velocity. The system moves around an attracting center in central newtonian field of forces. The center of mass of system goes on Keplerian circular orbit.

From equations of system motion which can be obtained with the help of principle of the least operation [2] the new form equations for the determining of the relative equilibria (positions of the rest of gyrostat in orbital coordinate system) of orbital gyrostat was derived [3]. By means of that equations it is studied the geometry of equilibria, the structure of the set of equilibria and bifurcation of the set of equilibria with respect to quantity of moment of momentum of rotor and other parameters of orbital gyrostat.

References

1. Beletskii V.V. The motion of an artificial satellite about its center of mass. M.: Nauka, 1965, p. 416 (in Russian).
2. Anchev A. Ravnovesni orientatsii na sputnik s rotori (Equilibrium Orientation of a Satellite with Rotors). Sofia: Izd. na Bulgarskata academiya na naukite. 1982. p. 132.
3. Chaikin S.V. Bifurcations of relative equilibriums of a gyrostat satellite for a particular case of location of its gyrostatic moment // Prikladnaya Matem. Mekhanika. 2013, Vol. 77, No. 5, p. 667–678 (in Russian).

Chaikin Sergey Vasil'evich, Institute for Systems Dynamics and Control Theory of the Siberia Branch of RAS, Lermontov Str., 134, Irkutsk, 664033, Russia, tel.: +7(3952)453032,
e-mail: schaik@yandex.ru