ON THE STABILITY OF STATIONARY SOLUTIONS OF THE TWICE-AVERAGED HILL'S PROBLEM TAKING INTO ACCOUNT THE PLANET OBLATENESS

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The problem of satellite orbital evolution with the combined influence of a distant perturbing body and the planet oblateness is well known (Laplace, 1805; Lidov, 1962, 1973; Kozai, 1963; Kudielka, 1994, 1997). The case of near-circular orbits is investigated in more details in (Sekiguchi, 1961; Allan and Cook, 1964; Vashkovyak, 1974).

In the full report (Vashkovyak,1998) the stability of the stationary solutions of the secular equations is investigated for elliptic orbits. The analytical and graphical dependences for the stationary values of the satellite orbital elements and the stability conditions are given. The main results are:

- the solution $\cos i = \cos\Omega = \sin\omega = 0, e = e(a)$ is stable in the linear approximation;
- the solution $\sin\Omega = \sin\omega = 0, e = e(a,\beta), i = i(\Omega,\beta)$ is unstable;
- for the solution $\sin\Omega = \cos\omega = 0, e = e(a,\beta), i = i(\Omega,\beta)$ both a region of unstability and a region of linear stability exist.

Here (a, e, i) are the standard notations of the Keplerian elements of the satellite orbit, Ω is the longitude of accending node, ω is the argument of pericenter; β is the angle between the orbital plane of the perturbing body (as a fundamental plane) and the equatorial plane of the planet.

The comparision with the results both of numerical integrations of the evolutionary system and of the paper (Kudielka, 1997) is carried out in the full report.

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