Drag effect

Brouwer and Hori (1) have discussed the motion of an artificial satellite through a medium causing drag on the motion by generalizing von Zeipel's method. The atmosphere is assumed to be spherically symmetric at least upward from the perigee height and stationary with respect to the Earth. The law of density is assumed to be isothermal. Hori is now revising this theory.

The theory of Cook *et al.* (2) is limited to nearly circular orbits with a slightly different law for the density.

Izsak (3) computed the periodic drag effect by the method of the variation of constants. Vinti (4) considered the effect of atmospheric drag on the secular variation of orbital inclination following the method of Garfinkel (5). The motion is separated into an initial elliptic stage, a quasi-steady spiral stage, and a final ballistic stage. The secular change is deduced separably for the spiral and the elliptic stages.

There are two representations for the effect of atmospheric drag which differ depending on the initial values of the orbital parameters. Other theories neglect the atmospheric rotation and hence commit errors of several percents. Westerman (6) presented a technique for the method which yields a unique expression for the secular change in each standard element, and computed (7) the life-time of an artificial satellite.

Jacchia (8) analyzed the observed drag effect for deducing the variable atmospheric density and especially the drag during the November 1960 events from the point of view of the solar-terrestrial relationship. Macé pointed out the effect of the atmospheric turbulence.

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Radiation pressure

Mello (1) has established an analytical theory of the motion of an artificial satellite under the action of the solar radiation pressure by taking into account the circumstance that the action is non-effective during the passage of the satellite in the shadow of the Earth. The effect is considered by multiplying the term in the perturbation function due to the radiation pressure by a factor called the shadow function. The expansions obtained are analogous to those in the satellite theory. Mello used Tchebychev's polynomials for the expansion. He concluded the non-existence of the secular terms in the major-axis, eccentricity and inclination, and computed the secular terms in the longitudes of the node and the perigee and the mean anomaly, and also the principal effect of long periods. He is planning to compute the observations of Echo and other satellites by modifying the theory for the case of small eccentricity.

Musen (2) and Kozai (3) independently worked out the effect of the solar radiation pressure on the motion of an artificial Earth satellite and computed the secular effect. Bryant (4) computed the effect by the method of Krylov-Bogoliubov. Sehnal (5) discussed the Poynting-Robertson

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