terms. He answers the question of how far we have to carry out the approximation so that higher order terms shall no longer change the qualitative feature of the motion. Izsak derived the perturbation equations for the modified action-angle variables of Vinti's dynamical problem and computed the secular and the long-period parts of the Hamiltonian, in order to obtain equations simpler than the usual.

Petty and Breakwell (**13**), and Struble (**14**) also discussed the problem of the critical inclination.

Message, Hori and Garfinkel (**15**) have shown that the solution for the critical case agrees with that for the non-critical case as far as the dominant terms in the immediate vicinity of the critical point. This should be interpreted as the fitting of the two asymptotic solutions.

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24-hour Earth satellite

The asymmetric character of the Earth's equator discovered by Kozai, Izsak, Kaula and others leads to observable effects on the orbits of close Earth satellites. This effect is important for stationary communication satellites, as well as for space telescopes or any observable platform designed to stay fixed at a given geographic longitude on the equator. The motion can be discussed in the same way as for a satellite with critical inclination. The influence of the principal longitude-dependent term of the Earth's potential on the orbit of a 24-hour satellite has been studied by Sehnal (**1**). He noticed the influence of tesseral harmonics on the long-period perturbation and obtained the periodic shift from the stationary point by considering the action of the Moon, then he discussed the long-period terms produced by the Earth's equatorial ellipticity and the secular terms of inclination due to the action of the Moon by the method of the variation of constants.

Blitzer, Boughton, Kang and Page (**2**) and Blitzer, Kang and McGuire (**3**) studied the influence of the principal longitude-dependent term by assuming the orbit to be nearly circular. There is a stable equilibrium point on the minor axis of the equatorial ellipse and an unstable equilibrium point on the major axis, the motion in latitude being simple periodic. Libration occurs of the order 850 days around the stable point. The nearby motion to the unstable point is a revolution.

Musen and Bailie (**4, 5**) studied the condition of stability even for an orbit with high inclination. They referred to von Zeipel's method after Brouwer, and computed the period and the amplitude of the libration and the mean motion of the revolution.

Morando (6) considered higher tesseral harmonics R_{mn} determined by Kozai as far as $m, n = 4$. He followed Hori's treatment of the motion of an artificial satellite with critical inclination by applying von Zeipel's method. The equilibrium positions obtained for $I = 0$ are from R_{22}, R_{31}, R_{33}, R_{42}, R_{44}. The equilibrium positions for $I \neq 0$ and e small are obtained for each harmonic R_{22}, R_{33}, R_{44}. Morando (7) also discussed the case of resonance in the form 24 hours $\times$ p/q where p and q are relatively prime integers.

Roy (8) writes me that he has completed a study of the usefulness of interplanetary orbits for probes, the periods of which are commensurable with one year.

Weimer (9) discussed the stability of synchronous orbits of a sphere and an ellipsoid under mutual gravitation. A synchronous orbit is one for which the rotational period of the ellipsoid is equal to its orbital period. A stationary orbit is one in which the sphere appears stationary as seen from the ellipsoid. It is found that the only stationary orbit is that for which either the major axis or the minor axis of the equator of the ellipsoid is pointing always towards the sphere. He also examined the condition for stability of these stationary orbits.

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Lunar probe

Kozai (1) applied his theory on the motion of an asteroid with high inclination and eccentricity to the motion of a lunar orbiter. The Moon is regarded as a tri-axial ellipsoid, the major axis of the equator being directed towards the Earth according to Jeffreys (2). The disturbing function consists of secular and short-period terms due to the oblateness of the Moon, bi-monthly and short-period terms due to the tri-axiality, and secular and periodic terms due to the Earth. The Earth's luni-centric orbit is assumed to be circular in the plane of the Moon's equator. If the orbiter is far from the Moon's surface, then a stable equilibrium solution exists. If it is a bit near, then there is an unstable equilibrium point. When the distance from the Moon's surface is far enough, a lunar orbiter has a good chance to impact the Moon's surface. Kozai seems to be in favour of the meteor impact hypothesis for the generation of the lunar craters from this point.

Huang (2) at first discussed the escape of an artificial Earth satellite from the Earth only on the basis of the Jacobi integral. Then he studied (3) numerically on an electronic computer the ideal orbits of a space vehicle for various Moon probes under the approximation of the restricted three-body problem: orbits which enclose the Earth and the Moon, which have periods commensurable with the period of the Moon, and which pass at relatively short distance from the Earth as well as from the Moon for a number of times. He computed (4) two families of periodic orbits that enclose both the Earth and the Moon in the plane of the Earth-Moon orbit. The stability of such orbits is also discussed.

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