1 Solar System Dynamics

NOTE:

field: Give the equation for the attraction between two bodies Sun and Earth, commaseparate the equation with its units. (using frac if necessary).

field:

$$F = G\frac{M_{Sun}M_{Earth}}{r^2}$$

,

$$N$$

NOTE:

field: Give the Vis-Viva equation, commaseparate the equation with its units. (using frac if necessary).

field:

$$\frac{V^2}{2} = \frac{\mu}{r} - \frac{\mu}{2a}$$

,

$$\frac{m^2}{s^2}$$

NOTE:

field: Give the equation for orbital period, commaseparate the equation with its units. (using frac if necessary).

field:

$$T = 2\pi\sqrt{\frac{r^3}{\mu}}$$

,

$$s$$

NOTE:

field: Give the equation for escape velocityV_{esc}, commaseparate the equation with its units. (using frac if necessary).

field:

$$V_{esc} = \sqrt{\frac{2\mu}{r}}$$

,

$$\frac{m}{s}$$

NOTE:

field: Give the Hill equation for Jupiter and the Sun, commaseparate the equation with its units. (using frac if necessary).

field:

$$r_{hill} = a\left(\frac{m_{Jupiter}}{3(m_{Sun} + m_{Jupiter}}\right)^{\frac{1}{3}}$$

,

$$m$$

2 Minor Bodies and Comets

NOTE:

field: Give the equation for the minimum radius of a spherical body, commaseparate the equation with its units. (using frac if necessary).

field:

$$R_{min} = \sqrt{\frac{2S}{\pi G \rho^2}}$$

,

$$m$$

NOTE:

field: Give the equation to compute the gravitational constant of a planet, commaseparate the equation with its units. (using frac if necessary).

field:

$$\mu = MG$$

,

$$\frac{km^3}{s^2}$$

NOTE:

field: Give the equation to compute the spherical harmonics of Earth due to the Moon, commaseparate the equation with its units. (using frac if necessary).

field:

$$U = \frac{\mu_{Moon}}{R_{Earth-Moon}} \sum_{n=2}^{\infty} \left(\frac{R_{Earth}}{R_{Earth-Moon}} \right)^n P_n \cos \phi$$

,

$$\frac{m^2}{s^2}$$

NOTE:

field: Give the equation to compute the legendre polynomials, ommit units.

field:

$$P_n(x) = \frac{1}{2^n n!} \frac{d^n}{dx^n} \left(x^2 - 1 \right)^n$$

,

$$\frac{m^2}{s^2}$$

NOTE:

field: Give the 0th,1st and 2nd legendre polynomials comma separated, ommit units.

field:

$$P_0(x) = 1$$

,

$$P_1(x) = x$$

,

$$P_2(x) = \frac{1}{2}(3x^2 - 1)$$

NOTE:

field: Give the equation for equilibrium temperatures.

field:

$$T = \frac{1 - A_B}{4\epsilon\sigma} \frac{F}{d^2}$$

NOTE:

field: Give the equation for Roches limit between a planet and its sat(telite). Assume it should not break at the surface.

field:

$$\frac{3\mu_{planet}}{d_{planet-sat}} r_{sat} = \frac{\mu_{sat}}{r_{sat}^2}$$

NOTE:

field: Give the equation for Roches limit between a planet and its sat(telite). Assume it should not break at the tidal pull $F_g = F_t$.

field:

$$\frac{Gm_{sat}\mu_{sat}}{r_{sat}^2} = \frac{2Gm_{sat}\mu_{sat}r_{sat}}{d_{planet-sat}^3}$$

NOTE:

field: Give the solar flux arriving at Earth, with its value and units. (using frac if necessary).

field:

$$F = \frac{L}{4\pi d_{Sun-Earth}} = 1366$$

,

$$\frac{W}{m^2}$$