

Csillagászati Észlelési Gyakorlat 3.

Képletgyűjtemény

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Derékszögű hely- és sebességkoordináták kiszámítása

$$\mu = GM$$

$$\xi = r \cos \nu$$

$$\eta = r \sin \nu$$

$$p = r(1 + e \cos \nu)$$

$$\dot{\xi} = -\sqrt{\frac{\mu}{p}} \sin \nu$$

$$\dot{\eta} = \sqrt{\frac{\mu}{p}}(e + \cos \nu)$$

$$P_x = \cos \omega \cos \Omega - \sin \omega \sin \Omega \cos i$$

$$P_y = \cos \omega \sin \Omega + \sin \omega \cos \Omega \cos i$$

$$P_z = \sin \omega \sin i$$

$$Q_x = -\sin \omega \cos \Omega - \cos \omega \sin \Omega \cos i$$

$$Q_y = -\sin \omega \sin \Omega + \cos \omega \cos \Omega \cos i$$

$$Q_z = \cos \omega \sin i$$

$$x = P_x \xi + Q_x \eta$$

$$y = P_y \xi + Q_y \eta$$

$$z = P_z \xi + Q_z \eta$$

$$\dot{x} = P_x \dot{\xi} + Q_x \dot{\eta}$$

$$\dot{y} = P_y \dot{\xi} + Q_y \dot{\eta}$$

$$\dot{z} = P_z \dot{\xi} + Q_z \dot{\eta}$$

Pályaelemek kiszámítása

$$\underline{\mathbf{c}} = \underline{\mathbf{r}} \times \underline{\mathbf{v}}$$

$$c_x = yv_z - zv_y$$

$$c_y = zv_x - xv_z$$

$$c_z = xv_y - yv_x$$

$$h = \frac{1}{2}v^2 - \frac{\mu}{r}$$

$$e = \sqrt{1 + \frac{2hc^2}{\mu^2}}$$

$$i = \arctg \frac{\sqrt{c_x^2 + c_y^2}}{c_z}$$

$$\lambda = -\frac{\mu}{r} \underline{\mathbf{r}} + \dot{\underline{\mathbf{r}}} \times \underline{\mathbf{c}}$$

$$\operatorname{tg} \frac{E}{2} = \sqrt{\frac{1-e}{1+e}} \operatorname{tg} \frac{\nu}{2}$$

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

$$p = \frac{c^2}{\mu}$$

$$a = \frac{p}{1-e^2}$$

$$\Omega = \arctg \left(-\frac{c_x}{c_y} \right)$$

$$\omega = \arctg \left(\frac{c \lambda_z}{c_x \lambda_y - c_y \lambda_x} \right)$$

$$M = n(t - \tau) = E - e \sin E$$

$$v = \sqrt{GM \left(\frac{2}{r} - \frac{1}{a} \right)}$$