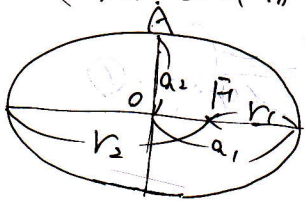


2. (講義12準(まじりか) - 12記入込が物. 7207)
 一心全部書きま可



面積 $S = \pi a_1 a_2$

面積速度一定の(2次)

周期 $T = \frac{\text{楕円の面積}}{\text{面積速度}}$

$\frac{dS}{dt} = \frac{l}{2\mu}$ (一定)

(1)式より, $r_1 = \frac{a}{1+\epsilon}, r_2 = \frac{a}{1-\epsilon}$

$a_1 = \frac{1}{2}(r_1 + r_2) = \frac{1}{2} \left(\frac{a}{1+\epsilon} + \frac{a}{1-\epsilon} \right) = \frac{a}{1-\epsilon^2}$

$\overline{OF} = a_1 - r_1 = \frac{a}{1-\epsilon^2} - \frac{a}{1+\epsilon} = \frac{\epsilon a}{1-\epsilon} = \epsilon a_1$

$AF_1 = a_1$ (2つの焦点がSの長さの和が等しい(=2a, 2a1=2AF1+S))

$\therefore a_2^2 = (AF_1)^2 - (\overline{OF})^2 = (1-\epsilon^2)a_1^2 = \frac{a^2}{1-\epsilon^2}$

$a_2 = \frac{a}{\sqrt{1-\epsilon^2}} = \sqrt{a} \sqrt{a_1}$

$T = \frac{\pi a_1 a_2}{\frac{l}{2\mu}} = \frac{2\pi \mu \sqrt{a}}{l} a_1^{\frac{3}{2}}$

$\frac{T^2}{a_1^3} = \left(\frac{2\pi \mu}{l} \right)^2 \frac{l^2}{\mu G m_1 m_2} = \frac{4\pi^2}{G(m_1 + m_2)} \approx \frac{4\pi^2}{G m_1}$ (一定) //