Med alle enheder!

$$T = \frac{1}{2} m_s \left[(\dot{x} - \omega y)^2 + (\dot{y} + \omega x)^2 \right]$$

$$V = -G m_s \left(\frac{M}{\sqrt{(x+R)^2 + y^2}} + \frac{m}{\sqrt{(r-x)^2 + y^2}} \right)$$

let's do $(x-r)^2$

4 symmetry ♥

$$L = T - V = \frac{1}{2} m_s \left[(\dot{x} - \omega y)^2 + (\dot{y} + \omega x)^2 \right] + G m_s \left(\frac{M}{\sqrt{(x+R)^2 + y^2}} + \frac{m}{\sqrt{(x-r)^2 + y^2}} \right)$$

$$p_x = \frac{\partial L}{\partial \dot{x}} = m_s (\dot{x} - \omega y) \iff \dot{x} = \frac{p_x}{m_s} + \omega y$$

$$p_y = \frac{\partial L}{\partial \dot{y}} = m_s (\dot{y} + \omega x) \iff \dot{y} = \frac{p_y}{m_s} - \omega x$$

$$H = \sum p_i \dot{q}_i - L$$

$$H = \frac{p_x^2 + p_y^2}{m_s} + p_x \omega y - p_y \omega x - \frac{1}{2} m_s \left[\left(\frac{p_x}{m_s} \right)^2 + \left(\frac{p_y}{m_s} \right)^2 \right] - G m_s \left(\frac{M}{\sqrt{(x+R)^2 + y^2}} + \frac{m}{\sqrt{(x-r)^2 + y^2}} \right)$$

$$\boxed{H = \frac{p_x^2 + p_y^2}{2 m_s} + p_x \omega y - p_y \omega x - G m_s \left(\frac{M}{\sqrt{(x+R)^2 + y^2}} + \frac{m}{\sqrt{(x-r)^2 + y^2}} \right)}$$

$$\boxed{\dot{x} = \frac{\partial H}{\partial p_x} = \frac{p_x}{m_s} + \omega y}$$

$$\boxed{\dot{y} = \frac{\partial H}{\partial p_y} = \frac{p_y}{m_s} - \omega x}$$

$$\boxed{\dot{p}_x = -\frac{\partial H}{\partial x} = \omega p_y - G m_s \left(\frac{M(x+R)}{\left((x+R)^2 + y^2\right)^{3/2}} + \frac{m(x-r)}{\left((x-r)^2 + y^2\right)^{3/2}} \right)}$$

$$\boxed{\dot{p}_y = -\frac{\partial H}{\partial y} = -\omega p_x - G m_s \left(\frac{M y}{\left((x+R)^2 + y^2\right)^{3/2}} + \frac{m y}{\left((x-r)^2 + y^2\right)^{3/2}} \right)}$$

$$t = k_t T$$

$$x = k_x X$$

$$y = k_y Y$$

$$p_x = k_{px} P_x$$

$$p_y = k_{py} P_y$$

$$\frac{k_x}{k_t} \frac{dX}{dT} = k_{px} \cdot \frac{P_x}{m_s} + k_y Y$$

$$\rightarrow \boxed{\frac{dX}{dT} = \frac{k_t k_{px}}{k_x} \cdot \frac{P_x}{m_s}} \boxed{+ k_t \omega \frac{k_y}{k_x} Y}$$

$$\rightarrow \boxed{\frac{dY}{dT} = \frac{k_t k_{py}}{k_y} \frac{P_y}{m_s}} \boxed{- k_t \omega \frac{k_x}{k_y} X}$$

$$\frac{k_{px}}{k_t} \frac{dP_x}{dT} = k_{py}\, \omega P_y - G m_s \left(\frac{M (k_x X + R)}{\left((k_x X + R)^2 + k_y^2 Y^2\right)^{3/2}} + \frac{m (k_x X - r)}{\left((k_x X - r)^2 + k_y^2 Y^2\right)^{3/2}} \right)$$

$$\boxed{\frac{dP_x}{dT} = K_t \frac{K_{py}}{K_{px}} \omega P_y - \frac{K_t}{K_{px}} \cdot G m_s \left(\frac{M(K_x X + R)}{\left((K_x X + R)^2 + K_y^2 Y^2\right)^{3/2}} + \frac{m(K_x X - r)}{\left((K_x X - r)^2 + K_y^2 Y^2\right)^{3/2}} \right)}$$

$$\downarrow$$

$$\boxed{\frac{dP_y}{dT} = -\frac{K_t K_{px}}{K_{py}} \omega P_x - \frac{K_t}{K_{py}} G m_s \left(\frac{M K_y Y}{\left((K_x X + R)^2 + K_y^2 Y^2\right)^{3/2}} + \frac{m K_y Y}{\left((K_x X - r)^2 + K_y^2 Y^2\right)^{3/2}} \right)}$$