$$I_{\square A} = M(aL)^2 + \underline{k^2 M}$$

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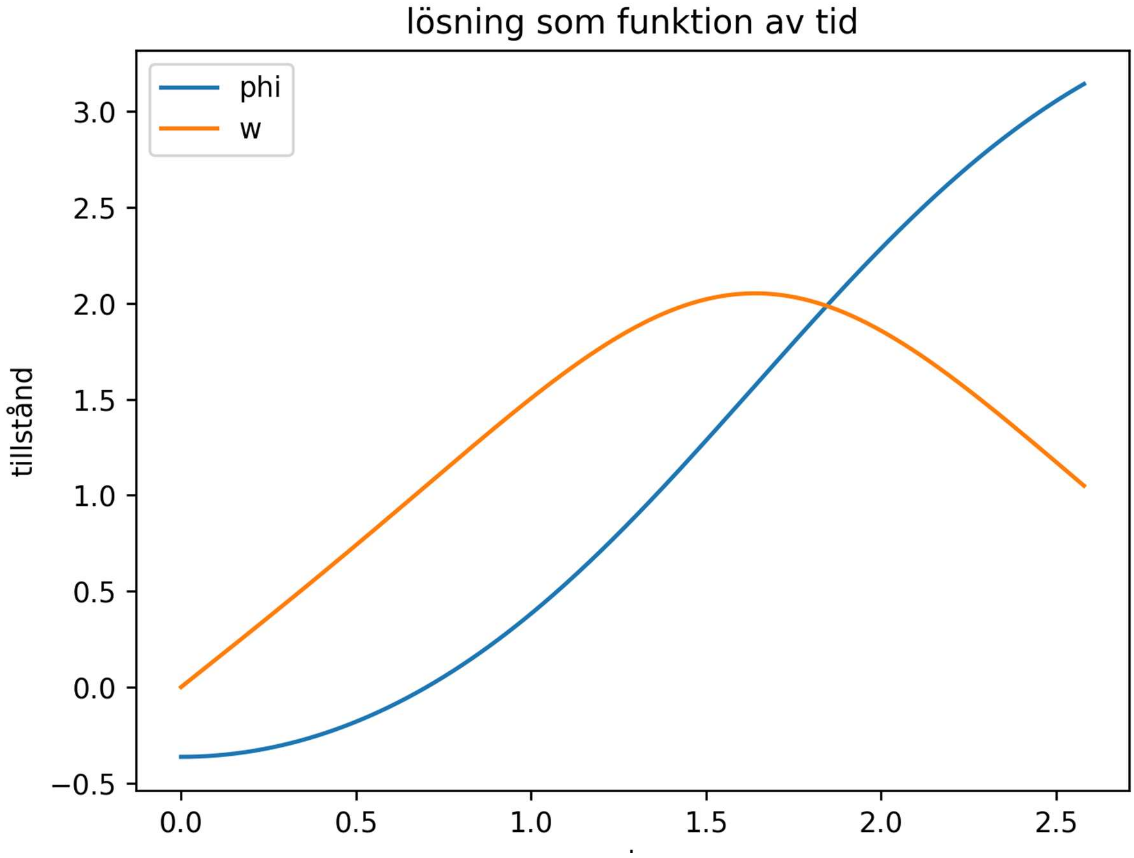
$$k_\lambda = \sqrt{\frac{I_\lambda}{m}} \Rightarrow I_\lambda = k^2 M$$

$$I_{SA} = m\left(\frac{L}{2} - aL\right)^2 + I_{smc} = m\left(\frac{L}{2} - aL\right)^2 + \frac{1}{12} m L^2$$

$$I_{smc} = \frac{1}{12} m L^2$$

$$I_a = M(aL)^2 + k^2 M + m\left(\frac{L}{2} - aL\right)^2 + \frac{1}{12} m L^2 = I_{\square A} + I_{SA}$$



$$\Rightarrow N = -m_p\left(g\sin(\varphi+\theta) + a_x\cos(\varphi+\theta) + a_y\sin(\varphi+\theta)\right)$$

$$p_x = (L - aL)\cos(\varphi) + l\cos(\varphi + \theta)$$

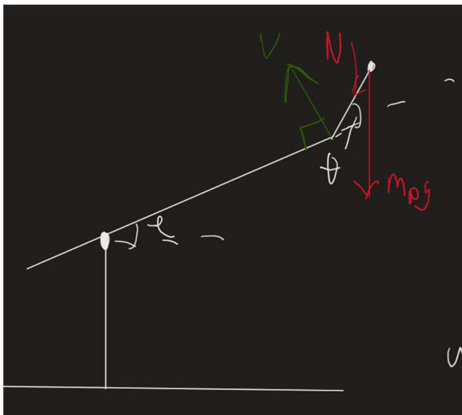
$$p_y = (L - aL)\sin(\varphi) + l\sin(\varphi + \theta)$$

$$V_x = (a-1)L\sin(\varphi)\dot{\varphi} - l(\dot{\theta} + \dot{\varphi})\sin(\varphi + \theta)$$

$$V_y = (a - 1) L \cos(\phi(t)) \phi'(t) + (\theta'(t) + \phi'(t)) \cos(\phi(t) + \theta(t))$$

$$a_x = (a - 1) L (\cos(\phi(t)) \phi'(t)^2 + \sin(\phi(t)) \phi''(t)) - l (\theta'(t) + \phi'(t))^2 \cos(\phi(t) + \theta(t)) - l \sin(\phi(t) + \theta(t)) (\theta''(t) + \phi''(t))$$

$$a_y = (a - 1) L (\cos(\phi(t)) \phi''(t) - \sin(\phi(t)) \phi'(t)^2) + (\theta'(t) + \phi'(t))^2 (-\sin(\phi(t) + \theta(t))) + \cos(\phi(t) + \theta(t)) (\theta''(t) + \phi''(t))$$



$$\uparrow :\ -m_p g - N\sin(\varphi + \theta) = m_p a_y$$

$$\rightarrow :\ = -N\cos(\varphi + \theta) = m_p a_x$$

$$F = Ma = \frac{G}{\varphi} m_p$$

$$u = \begin{bmatrix} \varphi \\ \dot{\varphi} \end{bmatrix} \Rightarrow \dot{u} = \begin{bmatrix} \dot{\varphi} \\ \ddot{\varphi} \end{bmatrix} = \begin{bmatrix} u_2 \\ \Sigma \frac{m}{I} \end{bmatrix}$$

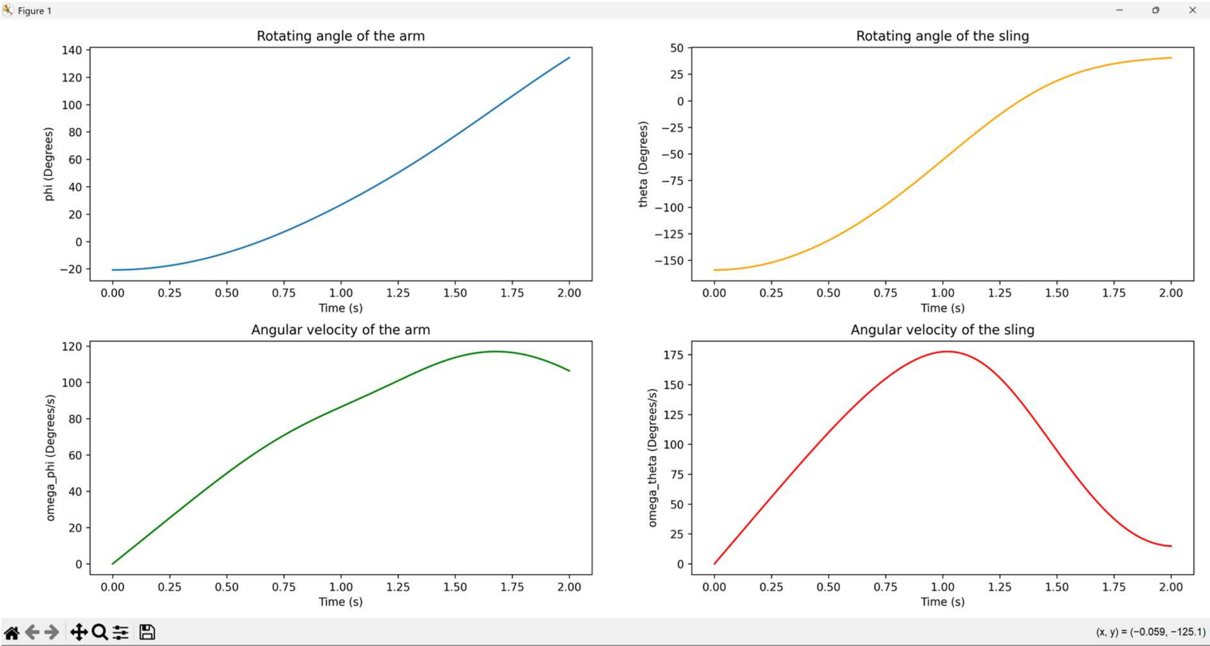
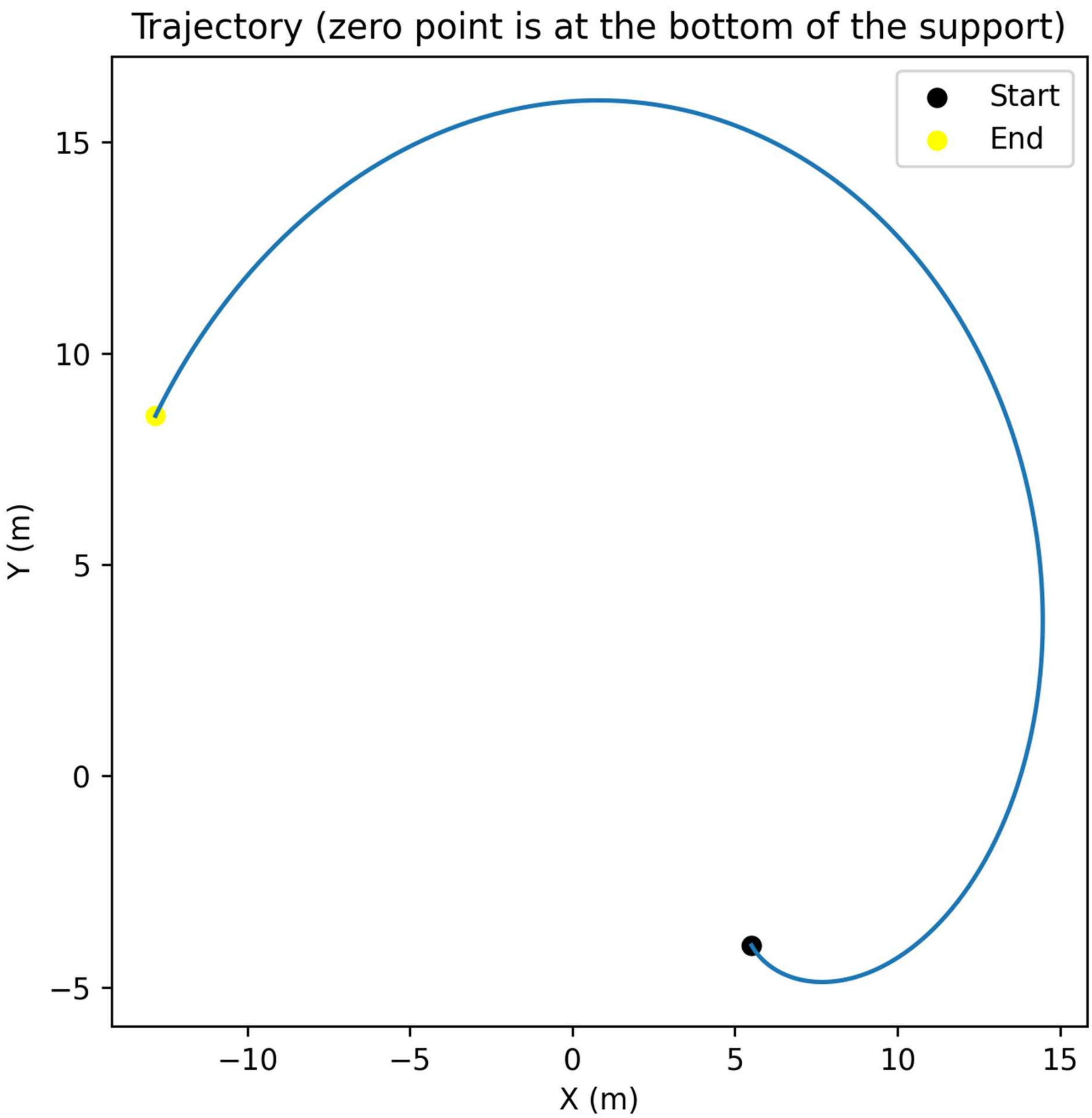


Figure 1
Rotating angle of the arm
phi (Degrees)
Time (s)
Rotating angle of the sling
theta (Degrees)
Angular velocity of the arm
omega_phi (Degrees/s)
Angular velocity of the sling
omega_theta (Degrees/s)
(x, y) = (−0.059, −125.1)


Trajectory (zero point is at the bottom of the support)
Start
End
Y (m)
X (m)