1 Description Lab 1

1.1 Task 1

1.1.1 Subtask 1a

Insert $x_w = v_w = \frac{dv_w}{dt} = i_A = 0$ into equation 3 of the mathematical model.

$$\frac{dv_w}{dt} = 0 = \frac{1}{m_w + m_s(1-\cos(\phi)^2)}(m_s l\omega^2 \sin(\phi) - m_s g \sin(\phi)\cos(\phi)) \tag{1}$$

$$m_s l\omega^2 \sin(\phi) = m_s g \sin(\phi)\cos(\phi) \tag{2}$$

$$l\omega^2 = g\cos(\phi) \tag{3}$$

Than change the fourth equation of the mathematical model to get the form $\dot{\omega}(t) = p_1 f1(\phi(t), \omega(t), \dot{\omega}(t))$.

$$\frac{d\omega}{dt} = \frac{1}{l\left(1 - \frac{m_s}{m_w+m_s}\cos(\phi)^2\right)}\left(g\sin(\phi) - \frac{m_s}{m_w+m_s}\underbrace{l\omega^2}_{g\cos(\phi)}\sin(\phi)\cos(\phi)\right) \tag{4}$$

$$\frac{d\omega}{dt} = \frac{1}{l\left(1 - \frac{m_s}{m_w+m_s}\cos(\phi)^2\right)}\left(g\sin(\phi)\left(1 - \frac{m_s}{m_w+m_s}\cos(\phi)^2\right)\right) \tag{5}$$

$$\frac{d\omega}{dt} = \frac{g}{l}\sin(\phi) \tag{6}$$

1.1.2 Subtask 1b

1.1.3 Subtask 1c

1.1.4 Subtask 1d

1.2 Task 2

1.2.1 Subtask 1a

1.2.2 Subtask 1b

1.2.3 Subtask 1c

1.2.4 Subtask 1d

1.2.5 Subtask 1e

1.2.6 Subtask 1f

1.3 Task 3