

Kelompok 5

Nama Anggota : Fadiah Farah Khoirunnisaq

2013022016

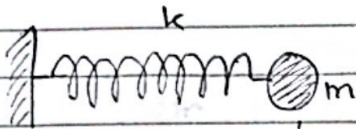
Gustin Wardani

2013022030

Elpin Nurul Rahmayani

2013022038

Tinjau mekanika newton dan lagrange untuk osilasi harmonik



* Newton

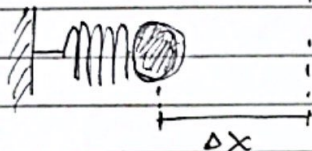
$$\sum F = ma$$

$$-kx = m \cdot a$$

$$-kx = m \cdot \ddot{x}$$

$$m\ddot{x} + kx = 0 \rightarrow \text{dibagi } m$$

$$\ddot{x} + \frac{k}{m}x = 0$$



$$\text{Persamaan diferensial OHS} \Rightarrow \frac{d^2 q_j}{dt^2} + \omega^2 q_j = 0$$

$$q_j = x \rightarrow \ddot{x} + \omega^2 x = 0$$

$$\ddot{x} + \frac{k}{m}x = 0$$

$$\ddot{x} + \omega^2 x = 0 \rightarrow \text{maka } \omega^2 = \frac{k}{m} \rightarrow \omega = \sqrt{\frac{k}{m}}$$

$$\hookrightarrow f = \frac{1}{2\pi} \sqrt{\frac{k}{m}} \rightarrow T = 2\pi \sqrt{\frac{m}{k}}$$

* Lagrange

$$V = \frac{1}{2} kx^2 \quad T = \frac{1}{2} m\dot{x}^2$$

$$L = T - V$$

$$L = \frac{1}{2} m\dot{x}^2 - \frac{1}{2} kx^2$$

$$\frac{d}{dt} \left(\frac{\partial L}{\partial \dot{x}} \right) = \frac{\partial L}{\partial x}$$

$$\frac{d}{dt} (x\dot{m}) = -kx$$

$$m\ddot{x} = -kx$$

$$m\ddot{x} + kx = 0$$

$$\ddot{x} + \frac{k}{m}x = 0$$

$$\ddot{x} + \omega^2 x = 0$$

$$\therefore \text{maka } \omega^2 = \frac{k}{m} \rightarrow \omega = \sqrt{\frac{k}{m}}$$

$$\hookrightarrow f = \frac{1}{2\pi} \sqrt{\frac{k}{m}} \rightarrow T = 2\pi \sqrt{\frac{m}{k}}$$