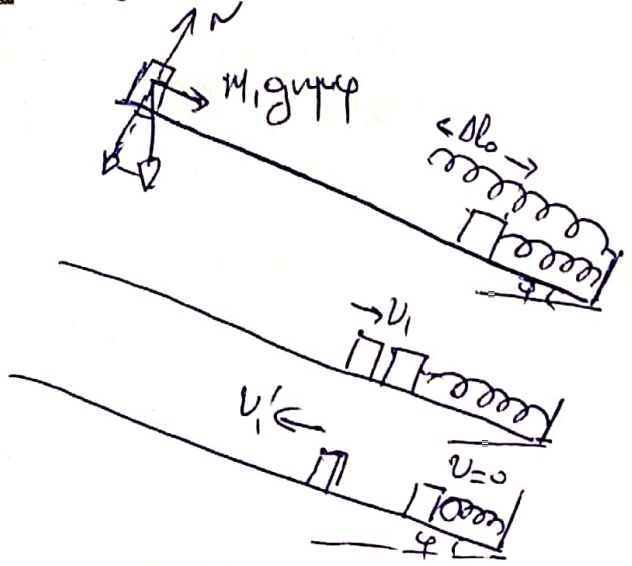
5.48



για τη Θ.Ι.

$\Sigma F = 0 \Rightarrow K \cdot \Delta l_0 = m_1 g \eta\mu\varphi$

$\Delta l_0 = \frac{1}{40} m$

για τη m_1 πριν την κρούση

$\Delta K = W \Rightarrow \frac{1}{2} m_1 \upsilon_1^2 = m_1 g \eta\mu\varphi \, l$

$\upsilon_1 = \sqrt{40} = 2\sqrt{10} \, m/s$

Για την κρούση

$\upsilon_1' = \frac{m_1 - m_2}{m_1 + m_2} \cdot \upsilon_1 = \frac{m_1 - 3m_1}{m_1 + 3m_1} \upsilon_1 = -\sqrt{10} \, m/s$

$\upsilon_2' = \frac{2m_1}{m_1 + m_2} \cdot \upsilon_1 = \sqrt{10} \, m/s$

Μετά την κρούση

Για την m_1 $\quad \Delta K = W_w \Rightarrow 0 - \frac{1}{2} m_1 \upsilon_1'^2 = -m_1 g \eta\mu\varphi \Delta x_1$

$\Rightarrow \Delta x_1 = 1 \, m$

Για την m_2 $\quad \Delta K = W_{Fελ} + W_w \Rightarrow 0 - \frac{1}{2} m_2 \upsilon_2'^2 =$

$= \frac{1}{2} K \Delta l_0^2 - \frac{1}{2} K \Delta l^2 + m_2 g \eta\mu\varphi (\Delta l - \Delta l_0) \Rightarrow$

$-10 = 200 \cdot \frac{1}{1600} - 200 \Delta l^2 + 5 (\Delta l - \Delta l_0) \Rightarrow$

$40 \Delta l^2 - \Delta l - 2 = 0$

$\Delta l = \frac{1 \pm \sqrt{321}}{80} = \begin{cases} \frac{1+18}{80} \simeq 0,23 \, m \\ \frac{1-18}{80} \end{cases}$

$\Delta x_2 = \Delta l - \Delta l_0 \simeq 0,2 \, m$