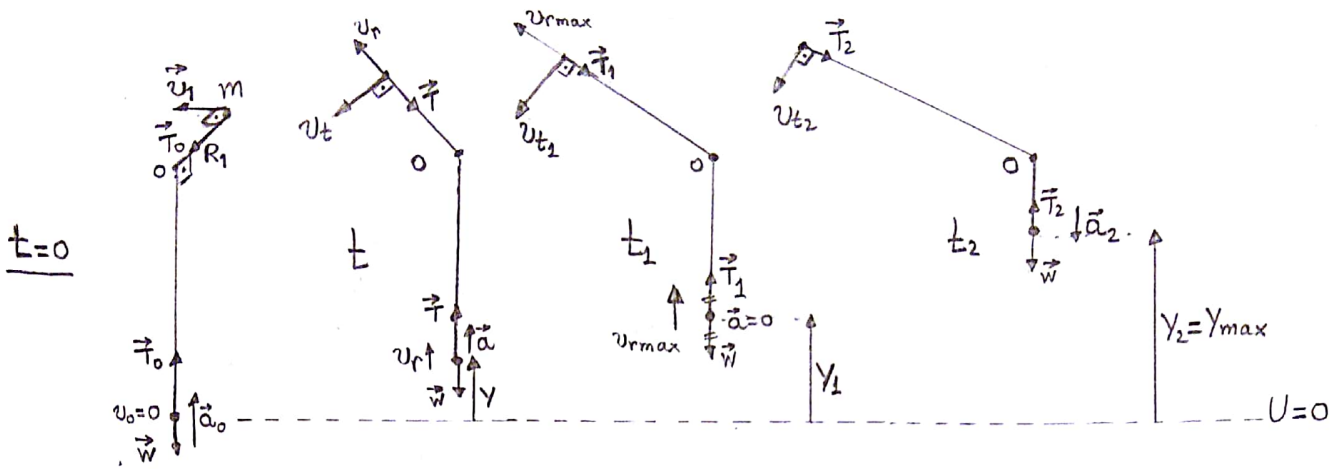


$\Sigma_1: m/2 \oplus \Sigma_3: m/2 \mu \epsilon v_0 = 8 \text{ m/s} \quad (m = 1 \text{ kg})$

$\Sigma_2: m \text{ και αρχικά θα έχουμε } R_1 = 0.2 \text{ m}$



t=0: $\Delta D: \frac{m}{2} \cdot v_0 = m \cdot v_1 \Rightarrow v_1 = v_0/2 = 4 \text{ m/s}$

$T_0 = \frac{m \cdot v_1^2}{R_1} = 80 \text{ N} = 8mg$ τότε $\Sigma_2: a_0 = \frac{8mg - mg}{m} \Rightarrow a_0 = 7g \text{ (↑)}$

t: $\Delta \Sigma_T(0): m \cdot v_1 \cdot R_1 = m \cdot v_t \cdot R \Rightarrow v_t = v_1 \cdot \frac{R_1}{R} \Rightarrow v_t \downarrow$
 όμως αρχικά $v_r \uparrow$ άρα $R \uparrow$
 $T = \frac{m \cdot v_t^2}{R} \Rightarrow T = \frac{m \cdot v_1^3}{v_1 \cdot R_1} \Rightarrow T \downarrow$

Για το $\Sigma_2: a = \frac{T}{m} - g \xrightarrow{T \downarrow} a \downarrow$ μέχρι $a = 0 \rightarrow v_r = v_{rmax}$ την t1.

μετά $T < mg \rightarrow$ επιβραδυνόμενη κίνηση μέχρι το $v_r = 0$ την t2.
 (το $v_r \downarrow$ αλλά έχει φορά προς τα πάνω $\rightarrow R \uparrow$)

$\Delta E: mgy + \frac{1}{2} m \cdot v_r^2 + \frac{1}{2} m (v_r^2 + v_t^2) = \frac{1}{2} m \cdot v_1^2 \Rightarrow 2gy + 2 \cdot v_r^2 + v_t^2 = v_1^2 \Rightarrow$

$\Rightarrow v_1^2 = v_t^2 + 2 \cdot v_r^2 + 2g \cdot y \Rightarrow v_r = \sqrt{0.5(v_1^2 - v_t^2) - g \cdot y} \quad \textcircled{1}$

t1: $a = 0 \rightarrow T_1 = mg \Rightarrow \frac{m \cdot v_{t1}^3}{v_1 \cdot R_1} = m \cdot g \Rightarrow v_{t1} = \sqrt[3]{v_1 \cdot g \cdot R_1} = 2 \text{ m/s}$

Τότε $\Delta \Sigma_{Tp}: R(t_1) = \frac{v_1 \cdot R_1}{v_{t1}} \Rightarrow R(t_1) = 0.4 \text{ m}$

κ' $y_1 = R(t_1) - R_1 \Rightarrow y_1 = 0.2 \text{ m}$

$\textcircled{1} \rightarrow v_{r1} = 2 \text{ m/s}$ άρα $v(t_1) = 2\sqrt{2} \text{ m/s}$.

t₂: v_r = 0 κ' a = g - $\frac{T_2}{m}$ τότε έχουμε $\gamma_{\max} = R_{\max} - R_1$

$$\left. \begin{array}{l} \textcircled{1} \rightarrow v_1^2 = v_{t_2}^2 + 2g \cdot \gamma_{\max} \\ \text{ΑΔΣΤρ. : } v_{t_2} = \frac{v_1 \cdot R_1}{R_{\max}} \end{array} \right\} \Rightarrow v_1^2 = \frac{R_1^2}{R_{\max}^2} \cdot v_1^2 + 2g \cdot (R_{\max} - R_1) \Rightarrow$$

$$\Rightarrow v_1^2 \cdot \frac{R_{\max}^2 - R_1^2}{R_{\max}^2} = 2g \cdot (R_{\max} - R_1) \Rightarrow$$

$$\Rightarrow \frac{v_1^2}{2g} \cdot \frac{(R_{\max} - R_1) \cdot (R_{\max} + R_1)}{R_{\max}^2} = R_{\max} - R_1 \xrightarrow{R_{\max} \neq R_1} \Rightarrow$$

$$\Rightarrow \frac{v_1^2}{2g} \cdot (R_{\max} + R_1) = R_{\max}^2 \Rightarrow 2g \cdot R_{\max}^2 - v_1^2 \cdot R_{\max} - v_1^2 \cdot R_1 = 0 \Rightarrow$$

$$\Rightarrow 20 \cdot R_{\max}^2 - 16 \cdot R_{\max} - 3.2 = 0 \Rightarrow 5 \cdot R_{\max}^2 - 4 \cdot R_{\max} - 0.8 = 0$$

$$\text{Τότε: } \Delta' = 4 + 4 = 8 \rightsquigarrow R_{\max} = \frac{2 + 2\sqrt{2}}{5} \text{ m} \simeq 0.964 \text{ m} (\sqrt{2} \simeq 1.41)$$

Επομένως: $\gamma_{\max} = 0.764 \text{ m}$

$$\text{κ' } v_{t_2} = \frac{v_1 \cdot R_1}{R_{\max}} \Rightarrow v_{t_2} \simeq 0.83 \text{ m/s}, v_r = 0.$$

$$T_2 = \frac{m \cdot v_{t_2}^2}{R_{\max}} \simeq 0.715 \text{ N} \rightsquigarrow a = g - \frac{T_2}{m} \Rightarrow a = 9.285 \text{ m/s}^2$$