

SOLUCIONES 9/II/07

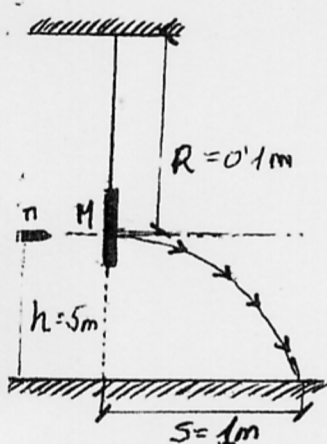
10) $\Pi = P^1 W^1 A^3 \rho^1 = (L^2 M T^{-3})^1 (L M T^{-2})^1 (L^2)^1 (L^{-3} M)^1 = L^0 M^0 T^0$

$$\begin{cases} L: 2a_1 + a_2 + 2a_3 - 3a_4 = 0 \\ M: a_1 + a_2 + a_4 = 0 \\ T: -3a_1 - 2a_2 = 0 \end{cases} \Rightarrow \begin{pmatrix} 2 & 1 & 2 & -3 \\ 1 & 1 & 0 & 1 \\ -3 & -2 & 0 & 0 \end{pmatrix} \begin{matrix} h=3 \\ i=4-3=1 \end{matrix}$$

$$\Rightarrow \Pi = P^1 W^{-3/2} A^{1/2} \rho^{1/2} = P \sqrt{\frac{A \rho}{W^3}} \Rightarrow F(\Pi) = 0 \Rightarrow \Pi = K = P \sqrt{\frac{A \rho}{W^3}} \Rightarrow P = K \sqrt{\frac{W^3}{A \rho}}$$

$$\Pi_M = \Pi_P \Rightarrow P_M \sqrt{\frac{A_M \rho_M}{W_M^3}} = P_P \sqrt{\frac{A_P \rho_P}{W_P^3}} \Rightarrow 8 \sqrt{\frac{A_M}{W_M^3}} = P_M \sqrt{\frac{A_P}{W_P^3}} = 8 \sqrt{\frac{1/4 A_P}{W_P^3/4}}$$

$$P_M = P_P \Rightarrow \boxed{P_M = \frac{64}{3} = 21.3 \text{ W}}$$



2) a) $m_1 \vec{v}_1 + m_2 \vec{v}_2 = m_1 \vec{v}'_1 + m_2 \vec{v}'_2 \Rightarrow \boxed{0.1 \cdot 1.5 = 0.1 v'_1 + 2.8 v'_2}$

$$h = \frac{1}{2} g t^2 \Rightarrow s = \frac{10}{2} t^2 \Rightarrow t = 1 \text{ s} \Rightarrow s = 1 = v'_1 t = v'_1 \cdot 1$$

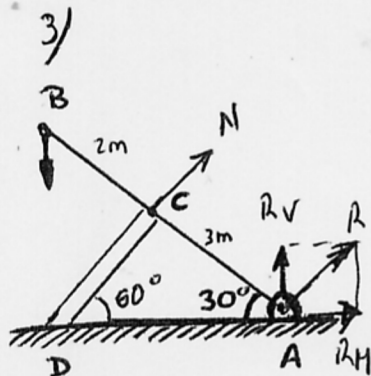
$$\Rightarrow v'_1 = 1 \text{ m/s} \Rightarrow 0.1 \cdot 1.5 = 0.1 \cdot v'_1 + 2.8 \cdot v'_2 \Rightarrow v'_2 = 0.5 \text{ m/s}$$

$$e = \frac{|v'_2 - v'_1|}{|v_1 - v_2|} = \frac{|0.5 - 1|}{|1.5 - 0|} = \frac{0.5}{1.5} = 0.33$$

$$c) \uparrow T \quad \boxed{T = F_c + m g = \frac{m_2 v'^2}{R} + m_2 g = \frac{2.8 \cdot 0.5^2}{0.1} + 2.8 \cdot 10 = 35 \text{ N}}$$

$$d) \frac{1}{2} m_2 v'^2 = m_2 g h_2 = m_2 g R (1 - \cos \theta) = \frac{1}{8} \quad \cos \theta = 3/8$$

$$\theta = \arccos(3/8) =$$



$$\sum F_y = 0 = R_v + N \cos 30 - 600$$

$$\sum F_x = 0 = N \sin 30 - R_h$$

$$\sum \vec{M}_A = 0 \Rightarrow -500 \cdot 5 \cos 30 + 3 \cdot N - 100 \cdot 3 \cos 30 = 0$$

$$\boxed{N = \frac{1400 \sqrt{3}}{2} = 808.3 \text{ N}} \quad \boxed{R_h = \frac{N}{2} = 404.15 \text{ N}}$$

$$\boxed{R_v = 600 - N \cos 30 = 600 - 894.9 \frac{\sqrt{3}}{2} = 195.85 \text{ N}}$$