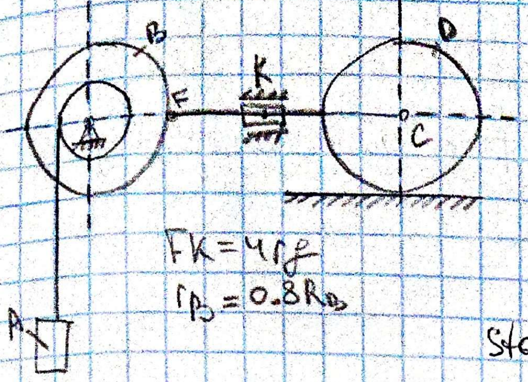
Homework 7



$F_K = 4 r g$
$r_B = 0.8 R_B$

R.O: A - Block - translation mot.

D - cylinder - rotat.

B - Pulley - rotation

initial conditions:

Start: all $V = 0$.

Finish: $V_{A(S)}$ - ?

Force Analysis:

$G_B, G_D, G_A, T, N_0, F_r$.

Solution:

$T_2 - T_1 = \sum_i A_i$

$T_1 = 0 \qquad T_2 = T_{A2} + T_{D2} + T_{B2} + T_{k2}$

$T_{B2} = 0{,}5 \cdot I_B \cdot \omega_B \cdot 2 \qquad I_B = m_B \cdot i_{Bx}^2 \qquad \omega_B = \frac{V_A}{r_B} \Rightarrow$

$\Rightarrow T_{B2} = \frac{m_B \cdot i_{Bx}^2 \cdot V_A^2}{2 r_B^2}$

$T_{A2} = 0{,}5\, m_A \cdot V_2^A$

$T_{D2} = 0{,}5 \cdot m_D \cdot V_C^2 + 0{,}5 I_D \cdot \omega_D^2 \qquad \omega_D = \frac{V_C}{R_D} = \frac{V_A R_B}{r_B \cdot R_D}$

$V_C = V_a \cdot \frac{R_B}{r_B} \qquad I_D = 0{,}5 \cdot m_D \cdot R_D^2 \Rightarrow$

$\Rightarrow T_{D2} = 0{,}5 \cdot m_D \cdot V_a^2 \cdot \frac{R_B^2}{r_B^2} + 0{,}25 \cdot m_D \cdot R_D^2 \cdot \frac{V_A^2 \cdot R_B^2}{r_B^2 \cdot R_D^2}$

$T_{k2} = 0{,}5 \cdot m_k \cdot V_k^2 \qquad V_k = V_A \cdot \frac{R_B}{r_B}$

Now ~~cal~~ Calculate the Work (A):

$A_A = m_a \cdot g \cdot S$

$A_B = 0$ - the object is stationary

$A_k = 0$

$A_D = m_D \cdot g \cdot 0 + \cancel{\#} A(F_r) + S_N\, p_D$

$A(F_r) = 0.$

φ_D .

$$X_D = Fk + R_B - \sqrt{(Fk)^2 - R_B^2}$$

$$\varphi_D = \frac{r_a}{R_B \cdot R_D} \cdot \lambda_D$$

Now we know all works and we can put them according to the formula

$T_2 = \Sigma_i A_i$, we get $V_A(s) = V_A(s(t))$

Answer to the second question:

Most likely, this will lead to more equations, as well as to a different solution method.