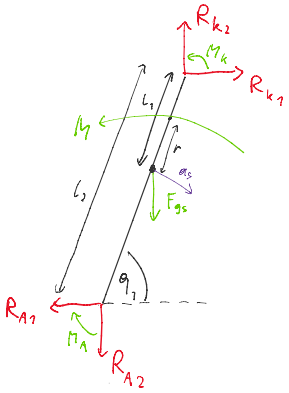
Homework 4 - Robin Steiner (11778873)

Samstag, 26. November 2022 11:16

Shank:



$x: \quad R_{K1} - R_{A1} = m_S \cdot a_{S_1}$

$R_{K_1} = m_S \cdot a_{S_1} + R_{A_1} = \underline{43,2\,N}$

$y: \quad R_{K2} - R_{A2} - F_{gS} = m_S \cdot a_{S_2}$

$R_{K_2} = m_S \cdot a_{S_2} + R_{A_2} + m_S \cdot g = \underline{-588,39\,N}$

$m = 80kg$	$r = 0,305\,l_2$
$m_S = 0,0485\,m$	$l_2 = 0,44\,m$
$a_{S_1} = -3,89\ m/s^2$	$\alpha_1 = 7,87\ rad/s^2$
$a_{S_2} = 0,4\ m/s^2$	$l_1 = 0,435\,l_2$
$R_{A_1} = 58,3\,N$	$q_1 = 86,5°$
$R_{A_2} = -628\,N$	$M_A = -6,6\,Nm$

$M: \quad I_S = m_S r^2$

$M = I_S \cdot \alpha_1 = m_S r^2 \alpha_1 = 0,478\,Nm$

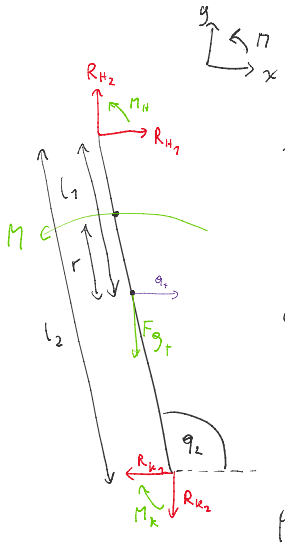
$M_1 = R_{A2}(l_2 - l_1)\cos q_1 - R_{A1}(l_2 - l_1)\sin q_1 = -22,36\,Nm$

$M_2 = R_{K2}\, l_1 \cos q_1 - R_{K1}\, l_1 \sin q_1 = -14,1\,Nm$

$M = M_K - M_A + M_1 + M_2$

$M_K = M + M_A - M_1 - M_2 = \underline{30,34\,Nm}$

Thigh:



$x: \quad R_{H1} - R_{K1} = m_t \cdot a_{t_1}$

$R_{H_1} = m_t \cdot a_{t_1} + R_{K_1} = \underline{3,55\,N}$

$y: \quad R_{H2} - R_{K2} - F_{gt} = m_t\, a_{S_2}$

$R_{H_2} = m_t \cdot a_{t_2} + R_{K2} + m_t \cdot g = \underline{-503,97\,N}$

$m = 80kg$	$r = 0,325\,l_2$
$m_t = 0,12\,m$	$l_2 = 0,34\,m$
$a_{t_1} = -4,13\ m/s^2$	$\alpha_2 = -4,84\ rad/s^2$
$a_{t_2} = -7,01\ m/s^2$	$l_1 = 0,435\,l_2$
$R_{K_1} = 43,2\,N$	$q_2 = 101,2°$
$R_{K2} = -588,39\,N$	$M_K = 30,34\,Nm$

$\left(\begin{array}{l} \sin(\pi - x) = \sin(x) \\ \cos(\pi - x) = -\cos(x) \end{array}\right)$

$M: \quad I_t = m_t r^2$

$M = I_t \cdot \alpha_2 = m_T r^2 \alpha_2 = -0,57\,Nm$

$M_1 = +R_{K_2}(l_2 - l_1)\cos q_2 - R_{K1}(l_2 - l_1)\sin q_2 = 13,81\,Nm$

$M_2 = +R_{H2}\, l_1 \cos q_2 - R_{H1}\, l_1 \sin q_2 = 13,96\,Nm$

$M = M_H - M_K + M_1 + M_2$

$M_H = M + M_K - M_1 - M_2 = \underline{2\,Nm}$