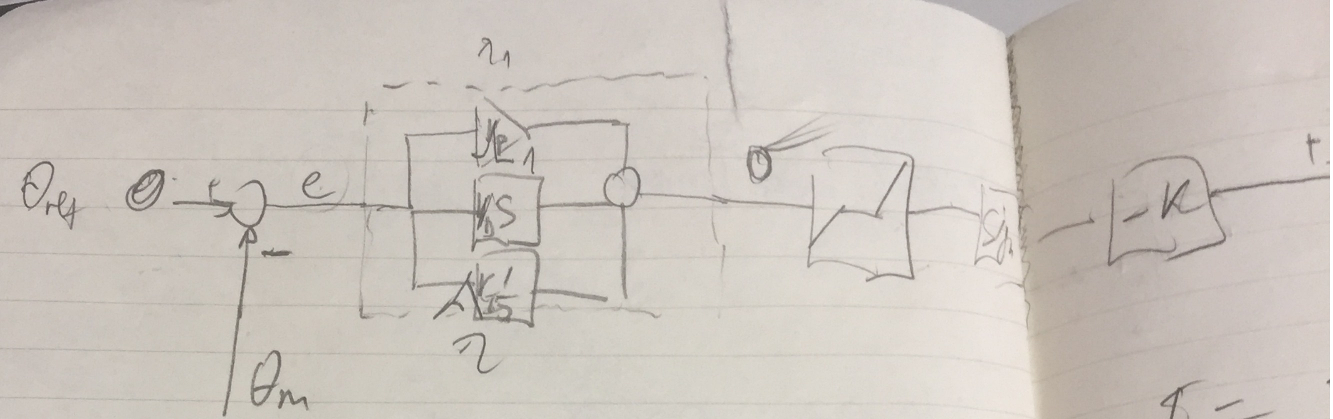


$$I_{yy} \cdot \dot{\omega}_y = \tau_{dis} + \tau$$

$$I_{yy} \dot{\omega}_y = \tau + \tau_{dis}$$

$$\cancel{\tau = F_3 l_3 - F_1 l_1}$$

$$\cancel{= r_{c,r_3} \times F_3 - r_{c,r_1} \times F_1}$$

$$\tau = \sum_{j=1}^{4} r_{c,r_j} \times F_{r,j}$$

$$F_1 = F_2 = F_3 = F_4 = \frac{F_T}{4}$$

$$r_{c_1 x} = l + \Delta x$$

$$r_{c_2 x} = -l + \Delta x$$

$$r_{c_3 x} = \Delta x$$

$$r_{c_4 x} = \Delta x$$

$\tau =$

$\tau =$

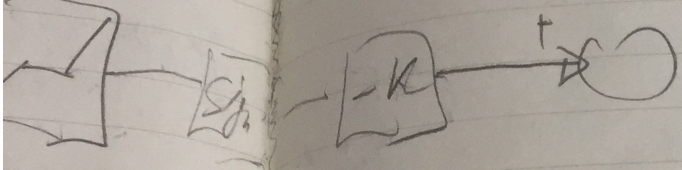
$=$

Δx

$\tau =$

$\tau_{ell} =$

system (11). Thus, the switching gains of the additional control vector τ_v are only required to be grater than the magnitudes of the disturbance compensation error vector p,



$$\Delta x = \cancel{\mu \cdot x_p}$$
$$\mu(x_1 + x_3)$$

$$\tau = F_g \cdot \Delta x$$

$$\tau = \frac{F_g}{4} \cdot \left(l + \frac{\Delta x}{4} \right) - \frac{F_g}{4} \left(l - \frac{\Delta x}{4} \right)$$

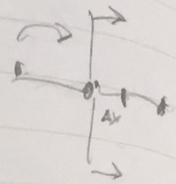
$$= \cancel{4} \cdot \frac{F_g}{\cancel{4}} \Delta x = F_g \cdot \Delta x$$

$$\Delta x = \mu \cdot (x_1 + x_3)$$

$$\tau = F_g \cdot \mu \cdot (x_1 + x_3)$$

$$\tau_{ref} \Rightarrow \quad (x_1 + x_3) = \frac{\tau_{ref}}{F_g \cdot \mu} = \frac{\tau_{ref}}{M \cdot g \cdot \frac{m}{M}} = \frac{\tau_{ref}}{m g}$$

$$x_1 + x_3 = \frac{\tau_{ref}}{mg}$$



$$x_1 = x_3 = x$$

$$2x = \frac{\tau_{ref}}{mg}$$

$$x_{\cancel{ref}} = \frac{\tau_{ref}}{2mg}$$

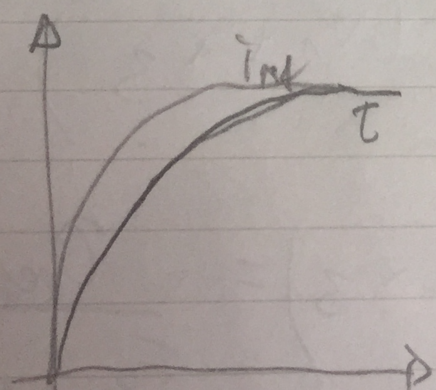
pozicija za vase 1, 3

$$a_n = I_{yy}$$
$$b_n = 0$$

$$e = y - y_{ref} = \theta_m - \theta_{ref}$$

$$\tau_{ref} = -k_2 \operatorname{sign}(\sigma) + I_{yy}\ddot{\theta}_{ref} - I_{yy} \cdot \lambda \cdot e(t)$$

$$\sigma = \dot{e} + \lambda_1 e + \lambda \int e(t)\,dt$$



$\Lambda_1 = a_n \wedge b_n = 0$

$\tau_{ref} = I_{yy}\,\ddot{\theta}_{ref} - I_{yy}\,\lambda \cdot e(t)$

$- \eta_2\, \mathrm{sign}(\sigma)$

$\boxed{S}$

$\sigma = \underline{\dot{e}} + \lambda_1 e + \lambda \int e(t)\,dt$

λ - parametar

$\lambda_1 = 0$

$\ddot{\theta}_{ref} = ?$

$$\theta_{ref} \longrightarrow \boxed{\frac{1}{(T_{f1}s+1)(T_{f}s+1)}} \longrightarrow \dot{\theta}_{ref},\ \dot{\theta}_{ref},\ \ddot{\theta}_{ref}$$

$$\frac{\dot{\theta}_{ref,t}}{\theta_{ref,1}} = \frac{1}{(T_{f1}s+1)(T_{f2}s+1)}$$

$$\left(T_{f1}T_{f2}s^2 + (T_{f1}+T_{f2}s) + 1\right)\theta_{ref} = \theta_{ref,f}$$

$$T_{f1}T_{f2}\ddot{\theta}_{ref,f} + (T_{f1}+T_{f2})\dot{\theta}_{ref,f} + \theta_{ref,f} = \theta_{ref,f}$$

$$\ddot{\theta}_{ref,f} = -\frac{(T_{f1}+T_{f2})}{T_{f1}T_{f2}}\dot{\theta}_{ref,f} - \frac{1}{T_{f1}T_{f2}}\theta_{ref,f} + \frac{1}{T_{f1}T_{f2}}\theta_{ref}$$