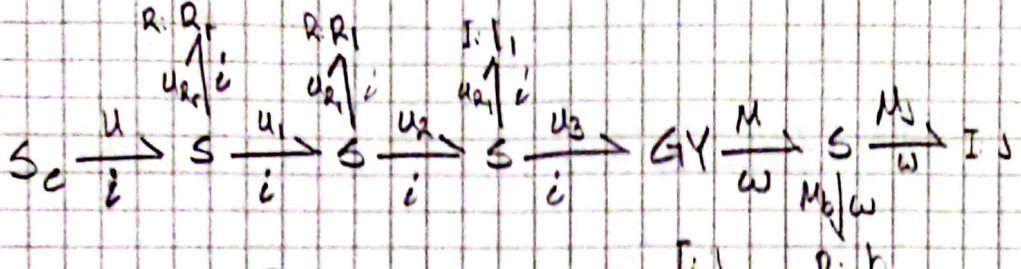
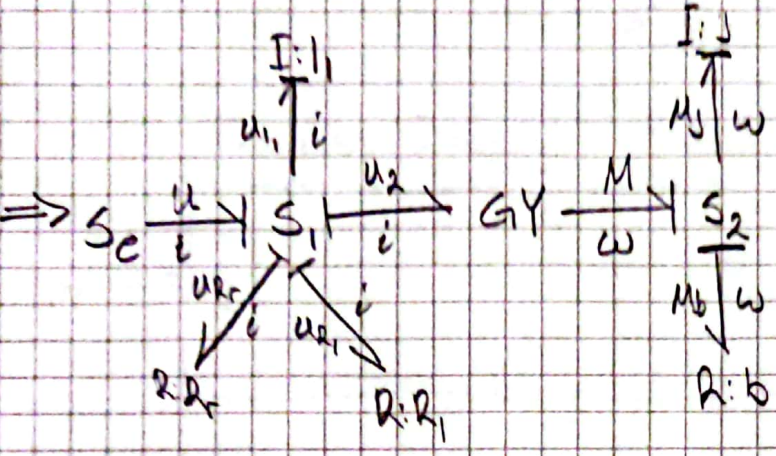
Lab 1 Casper Larsson

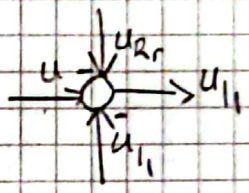
1.1



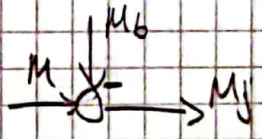


S_e: $u = u$

S_1: $u - u_{I_1} - u_{R_r} - u_{R_1} = 0 \Leftrightarrow u_{I_1} = u - u_{R_r} - u_{R_1} \Rightarrow$



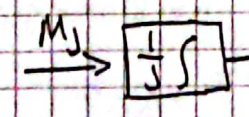
S_2: $M - M_J - M_b = 0 \Leftrightarrow M_J = M - M_b \Rightarrow$



GY: $M = K_i \cdot i \Rightarrow$

I: I_1 $i = \frac{1}{I_1} \int u_{I_1}(\tau) d\tau \Rightarrow$

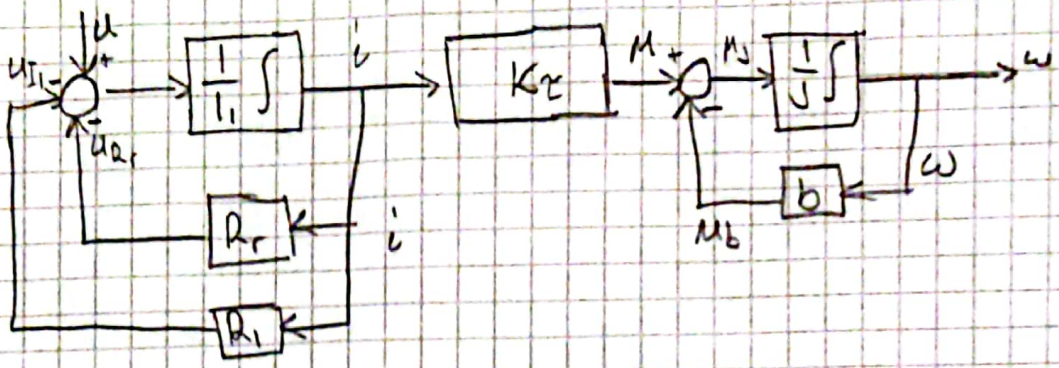
I: J $\omega = \frac{1}{J} \int M_J(\tau) d\tau \Rightarrow$



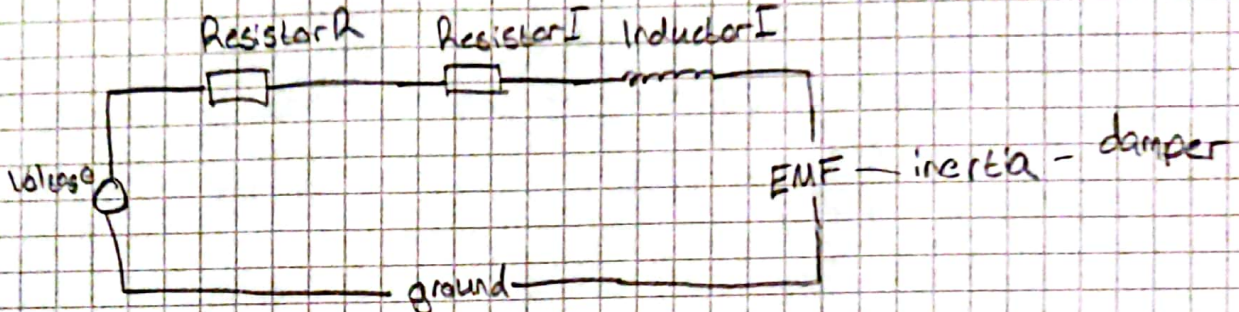
R: R_r $u_{R_r} = R_r \cdot i \Rightarrow$

R: R_1 $u_{R_1} = R_1 \cdot i \Rightarrow$

R: b $M_b = b\omega \Rightarrow$



1.2



1.3

$R_1 = 0.8\,\Omega$

$R_r + R_1 = 1.15\,\Omega \Rightarrow R_r = 0.35\,\Omega$

$I_1 = 3.39\,mH = 3.39 \cdot 10^{-3}\,H$

$K_t = 0.056\,Nm/A$

$J = \frac{\pi}{2} r^4 h \rho = \left\{ \begin{array}{l} r = \frac{20}{2}\,mm = 10 \cdot 10^{-3}\,m = 0.01\,m \\ h = 10\,mm = 0.01\,m,\ \rho = 2.7 \cdot 10^3\,kg/m^3 \end{array} \right\} = \frac{\pi}{2} \cdot 0.01^4 \cdot 0.01 \cdot 2.7 \cdot 10^3$

$= 1.35\pi \cdot 10^{-7}\,kgm^2$

$b = \frac{\Delta M}{\Delta \omega} \cdot \frac{0.13 - 0.2}{(6000)/60 \cdot 2\pi} = \frac{-0.07}{200\pi} \cdot \frac{3.5 \cdot 10^{-4}}{\pi}$