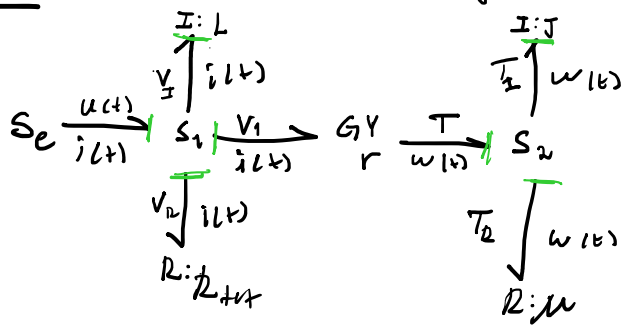
Emil Alsbjer, emial733

1.1 Assume motor is driven by a voltage source, meaning we have a effort source



• Causality

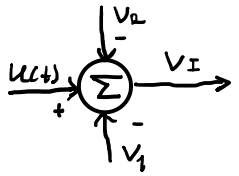
S_1 has same flow and S_2 has same flow, therefore S-functions.

For s-function we have zero effort sum:

$S_e: V$ $S_1: u(t) - V_I - V_1 - V_R = 0$, Based on the causality we rewrite =>

$V_I = u(t) - V_1 - V_R$, Meaning the block will look like

output, input

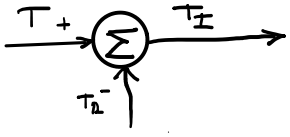


used

$S_2: T - T_R - T_I = 0$, Again based on causality, =>

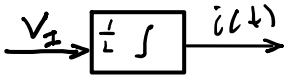
$T_I = T - T_R$

output, input



used

I: L $i(t) = \frac{1}{L}\int^{t} V_I(\tau)\,d\tau$ →



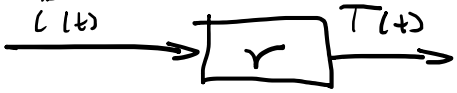
used

R: R $V_R(t) = R_{tot} i(t)$ →

used

GY: $V_1(t) = \frac{1}{r} w(t)$ →

$T(t) = r\,i(t)$ →



used

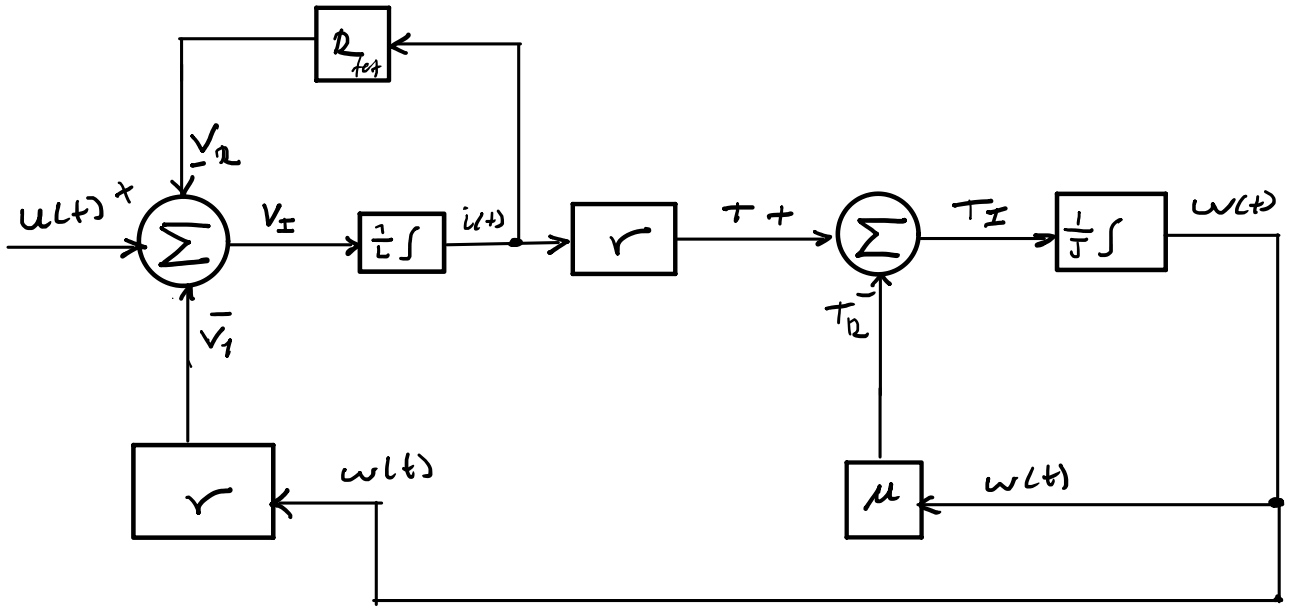
I: J $w(t) = \frac{1}{J}\int^{t} T_I(\tau)\,d\tau$ →

used

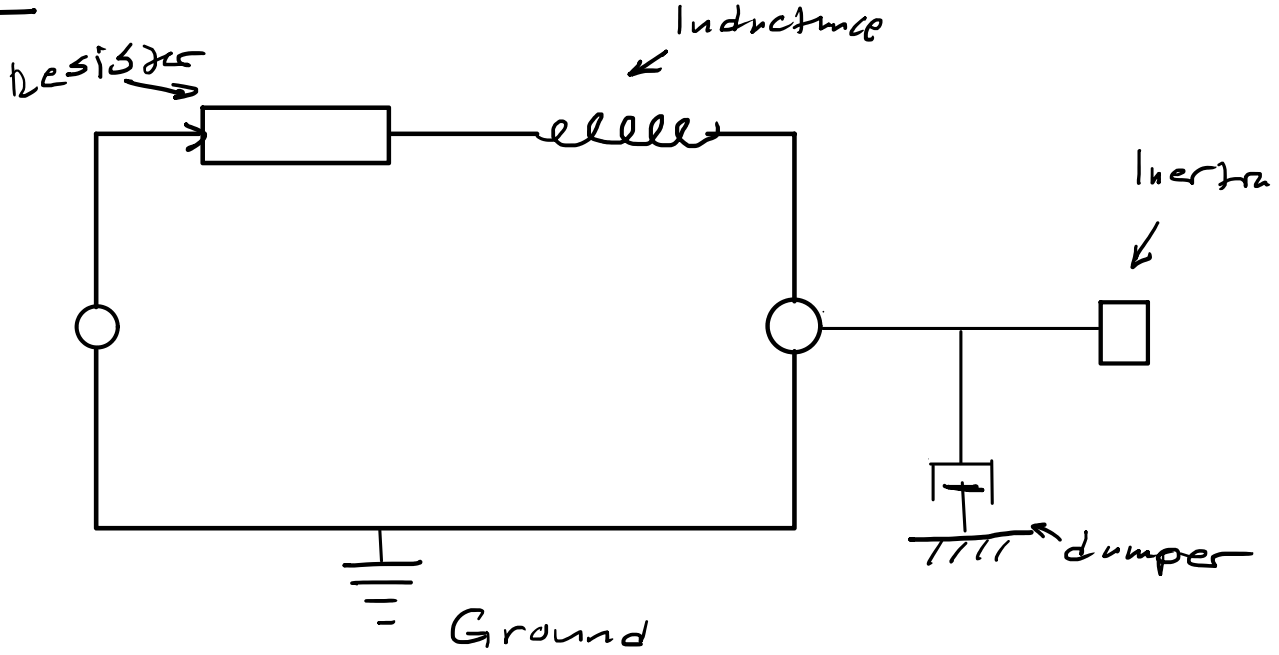
R: μ $T_R(t) = \mu \cdot w(t)$ →

Drawing the block diagram

Drawing the block diagram



1.2 Modelica schaltet



1.3

Using values for the motor M-586-0585

1) Termnd resistance: $R_t = 1.15\,\Omega$

Armature resistance: $R_I = 0.8\,\Omega$

$R_r = R_t - R_I = 0.35\,\Omega$

2) Armature inductance: $I_I = 3.39\,mH$

3) Roter moment of inertia: $3.38 \cdot 10^{-5}\ kg \cdot m^2$

4) Torque constant $r = \frac{T}{I}$: $r = \frac{0.2\ Nm}{3.9\ A} = 0,05128\ Nm/A$

5) Mechanical μ:

$$\frac{\Delta Y}{\Delta X} = \frac{(0,2 - 0,15)}{(4000 - 2000)} = \frac{0,05 \cdot 60}{4000 \cdot 2\pi} = 1.194 \cdot 10^{-4}$$