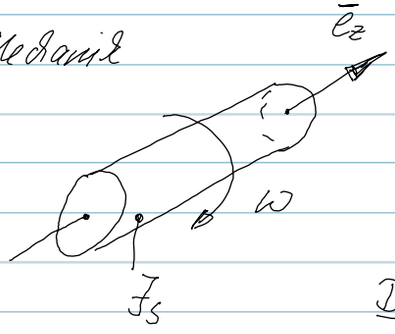
Modell Motor

Mechanik



$\dot{\varphi} = \omega$

$\ddot{\varphi} = \dot{\omega}$

keine Reibung

$\dot{\bar{D}} = \sum \bar{M}$

DIS:

$\bar{e}_z$: $J_S \ddot{\varphi} = M$ (1)

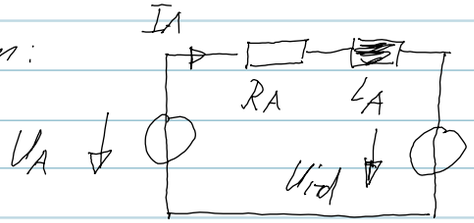
Wandlergleichung:

$M = k_\varphi \Phi_0 \cdot I_A = k_1 I_A$ (2)

$U_{ind} = C_\varphi \Phi_0 \cdot \omega = k_2 \omega$ (3)

$k_1 = k_2 = K$

elektrisches System:



Maschensatz:

$-U_A + R_A I_A + L_A \frac{d}{dt} I_A + U_{ind} = 0$ (4)

Systeme verbinden: $M = M$ $\quad J_S \ddot{\varphi} = K I_A$ $\quad I_A = \frac{J_S}{K} \ddot{\varphi}$

$U_A = R_A I_A + L_A \frac{d}{dt} I_A + U_{ind}$

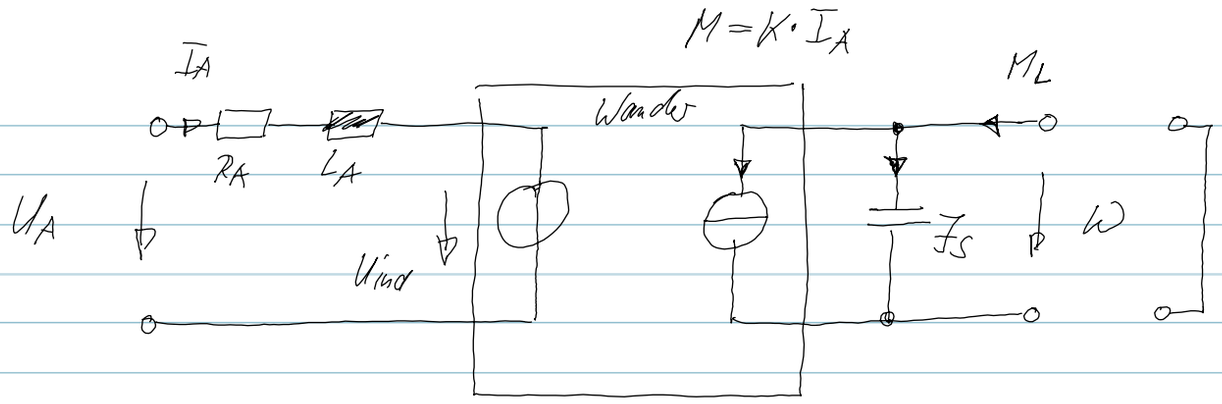
$U_A = \frac{R_A J_S}{K} \ddot{\varphi} + \frac{L_A J_S}{K} \dddot{\varphi} + K\omega$

$\dot{\varphi} = \omega$

$\ddot{\varphi} = \dot{\omega}$

$\dddot{\varphi} = \ddot{\omega}$

$$\boxed{\frac{L_A J_S}{K} \ddot{\omega} + \frac{R_A J_S}{K} \dot{\omega} + K\omega = U_A}$$



$U_{ind} = K \cdot \omega$ $\qquad$ $M - M_J + M_L = 0$

mechanischer Kurzschluss: $\omega = 0$

$U_{ind} = 0$; $M_L = 0$

$$I_A = \frac{U_A}{R_A} \Rightarrow M_0 = K \frac{U_A}{R_A}$$