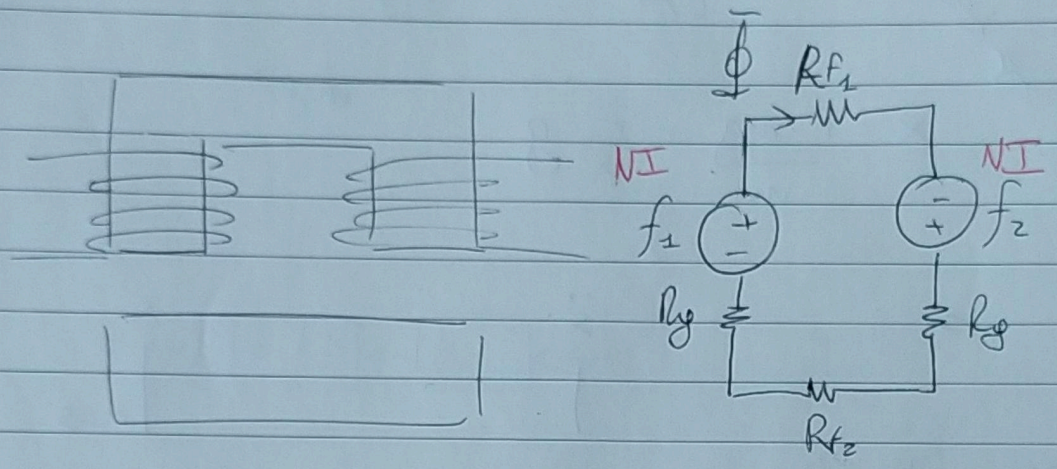
Magnetic:

$B = \mu_0 H$ → void

$B = \mu_0 \cdot \mu_r \cdot H$ → material

$$\oint_L \vec{H}\, d\vec{r} = \sum_k I$$



$R_f = R_{f_1} + R_{f_2}$

$R_{TOT} = 2R_g + R_f$

$$\Phi = \frac{f_1 + f_2}{R_{TOT}}$$

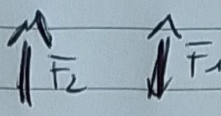
$2NI = \Phi \cdot R_{TOT}$ $\qquad$ $\Phi = \frac{2NI}{R_{TOT}}$

$\Phi = B \cdot A$

$$R_{TOT} = 2R_g + R_f = \frac{2}{\mu_0}\frac{L_g}{A} + \frac{(L_{f_1} + L_{f_2})}{\mu \cdot A}$$

$$B = \frac{2NI}{A \cdot R_{TOT}}$$

$$\bar{F} = \frac{A \cdot B^2}{2\mu_0}$$



$$\bar{F}_{TOT} = \frac{2 \cdot A \cdot B^2}{2\mu_0} = \frac{A \cdot \left(\frac{N_1 I}{A \cdot R_{TOT}}\right)^2}{\mu_0} = \frac{\frac{N_1^2 I^2}{A \cdot R_{TOT}^2}}{\mu_0} =$$

$$= \frac{N_1^2}{A} \cdot \frac{I^2}{\left(\frac{2}{\mu_0}\frac{l_g}{A} + \frac{l_{f_1} + l_{f_2}}{\mu \cdot A}\right)^2} = \frac{N_1^2}{A} \cdot \frac{I^2}{\frac{1}{\mu_0^2 A^2}\left(l_g \cdot 2 + \frac{l_f}{\mu_r}\right)^2} =$$

$$= N_1^2 \frac{I^2}{\frac{1}{\mu_0 \cdot A}\left(2l_g + \frac{l_f}{\mu_r}\right)^2} = N_1^2 \cdot \mu_0 \cdot A \cdot \frac{I^2}{\left(2l_g + \frac{l_f}{\mu_r}\right)^2}$$