

Elektromagnetická indukce



Magnetický indukční tok

$$\Phi = \iint_S \vec{B} \cdot d\vec{S}$$

$$\oiint_S \vec{B} \cdot d\vec{S} = 0$$

Faradayův zákon elektromagnetické indukce

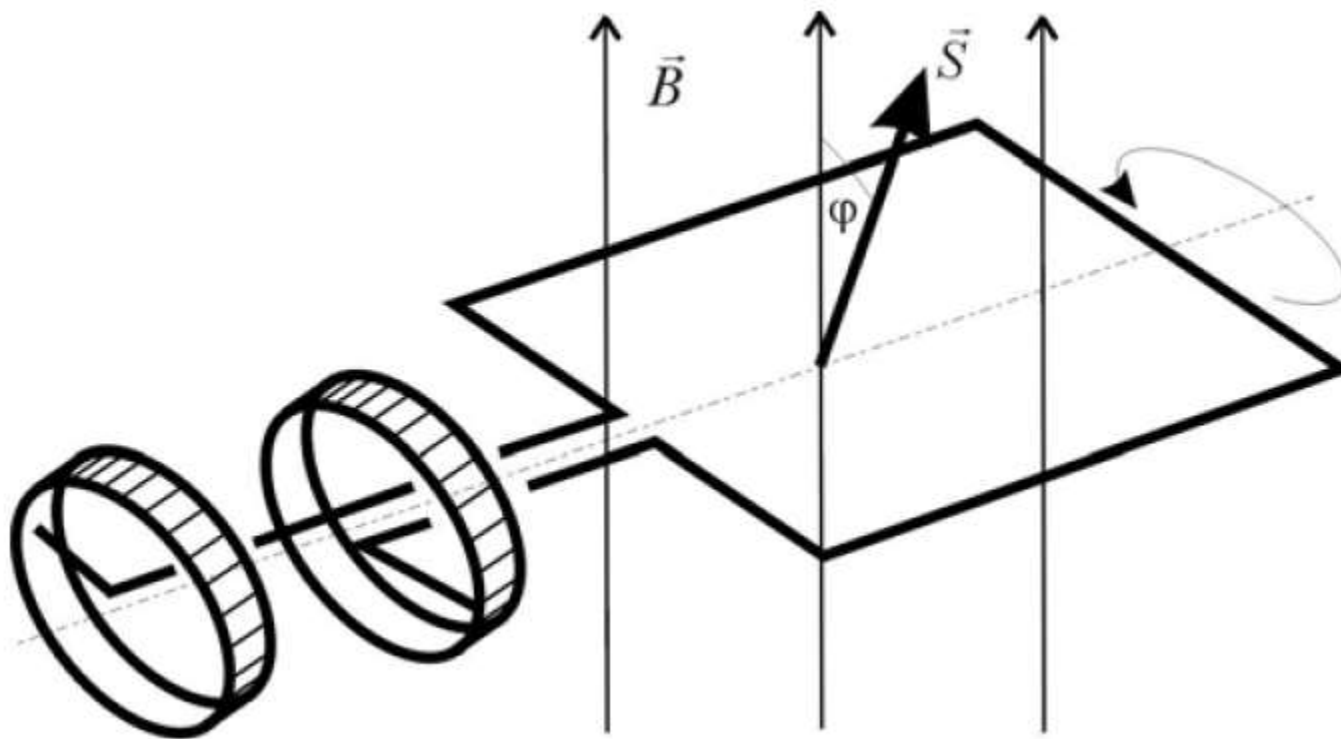
$$\mathcal{E} = -\frac{d\Phi}{dt}$$

Lenzovo pravidlo



http://fyzika.jreichl.com/index.php?sekce=browse&page=video&lpage=302&file=e_elmg_indukce.wmv

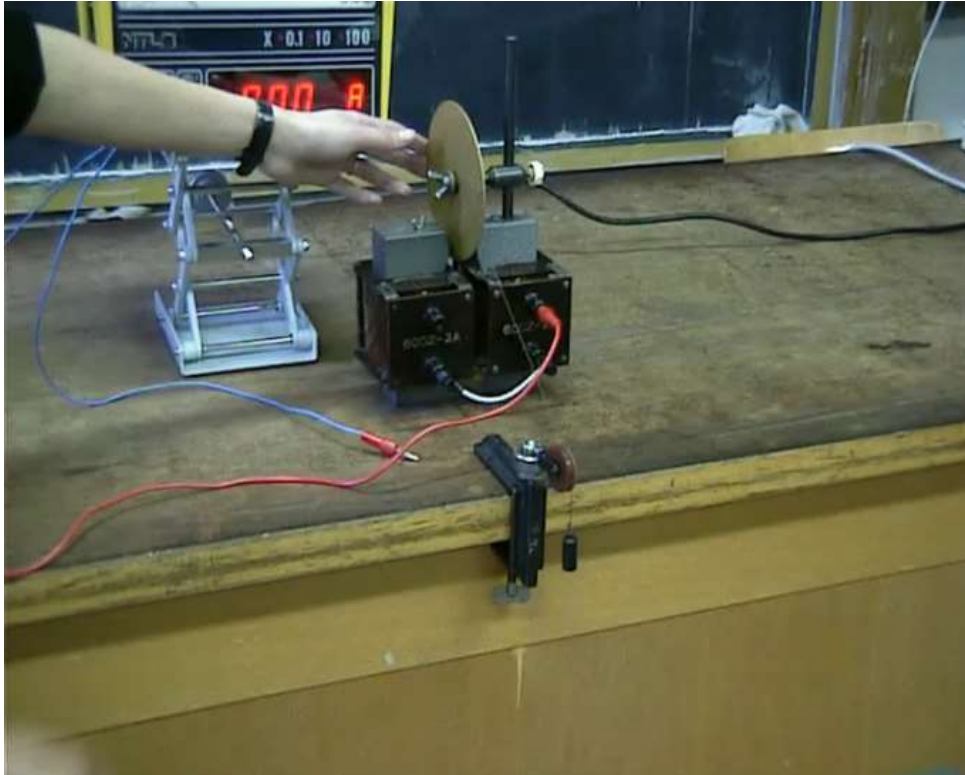




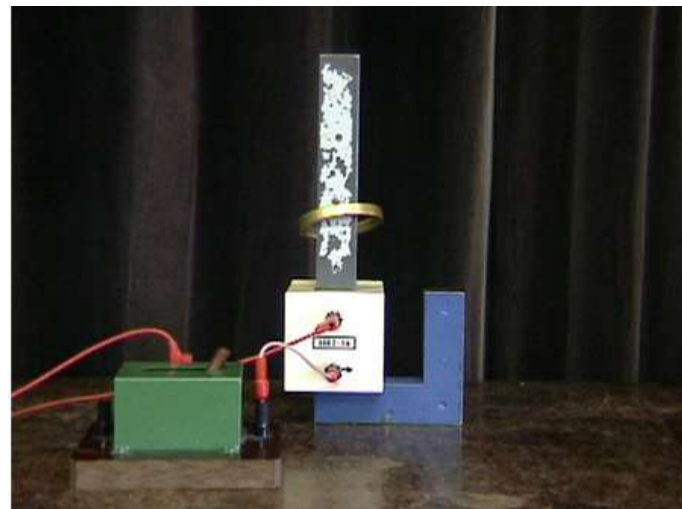
$$\mathcal{E} = -\frac{d\Phi}{dt} = BS\omega \sin \omega t$$

<http://phet.colorado.edu/en/simulation/generator>

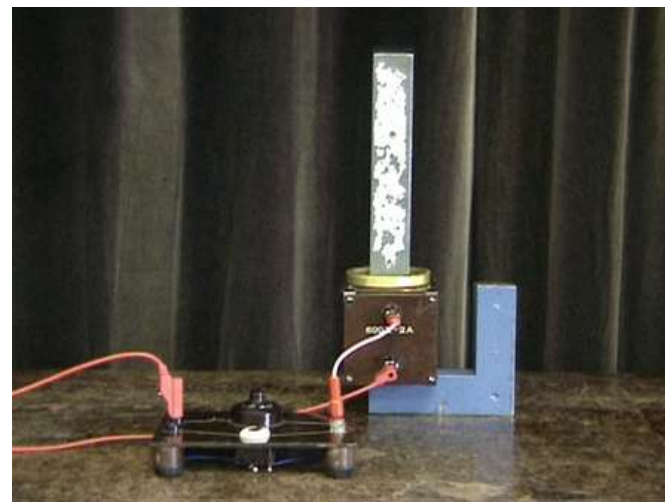
<http://fyzweb.cz/materialy/videopokusy/POKUSY/MAGBRZDA/INDEX.HTM>



[http://fyzweb.cz/materialy/videopokusy/POKUSY/LEVITUJICIKR
OUZEK/INDEX.HTM](http://fyzweb.cz/materialy/videopokusy/POKUSY/LEVITUJICIKR
OUZEK/INDEX.HTM)



[http://fyzweb.cz/materialy/videopokusy/POKUSY/MAGNETICK
EDELO/INDEX.HTM](http://fyzweb.cz/materialy/videopokusy/POKUSY/MAGNETICK
EDELO/INDEX.HTM)



Vlastní indukčnost

vlastní indukčnost smyčky

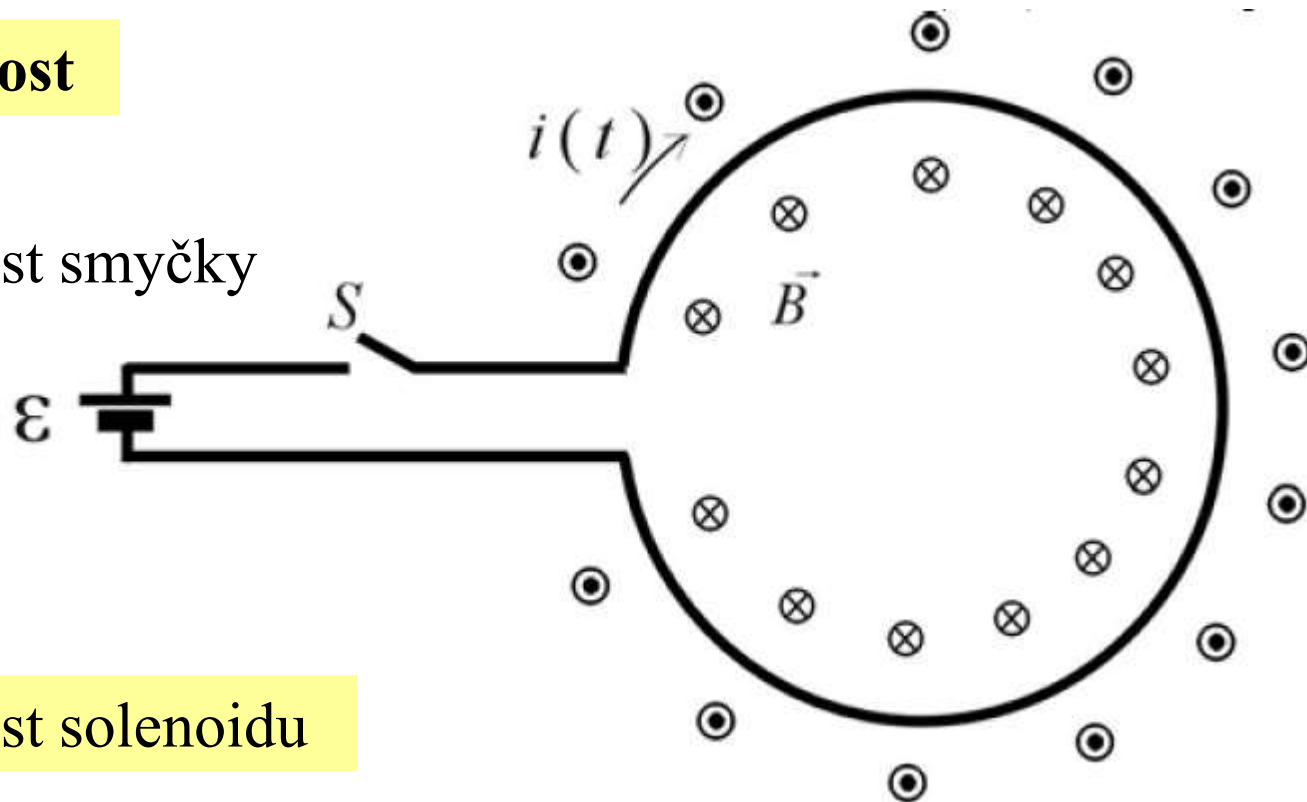
$$\Phi = Li$$

$$\mathcal{E} = -L \frac{di}{dt}$$

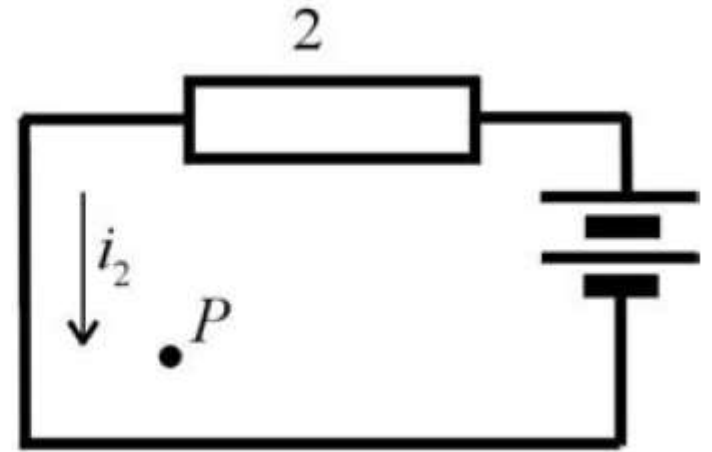
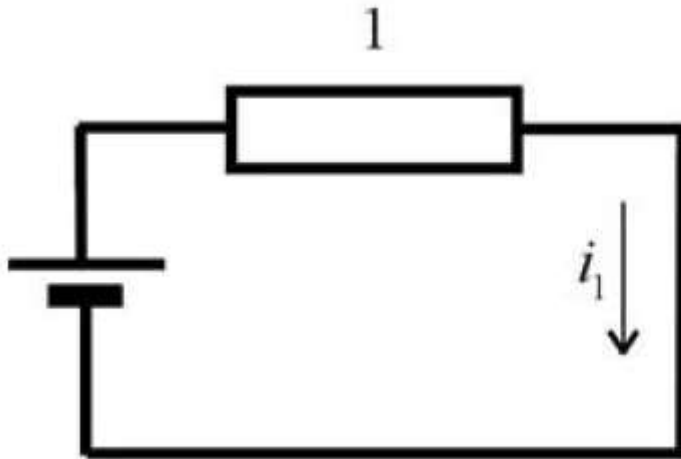
vlastní indukčnost solenoidu

$$\Phi = \iint_S \vec{B} \cdot d\vec{S} = N\vec{B} \cdot \vec{S} = NB S = \frac{\mu_0 N^2 i}{l} S$$

$$L = \mu_0 \frac{N^2 S}{l}$$



Vzájemná indukčnost



$$\Phi_2 = L_2 i_2 + M_{12} i_1$$

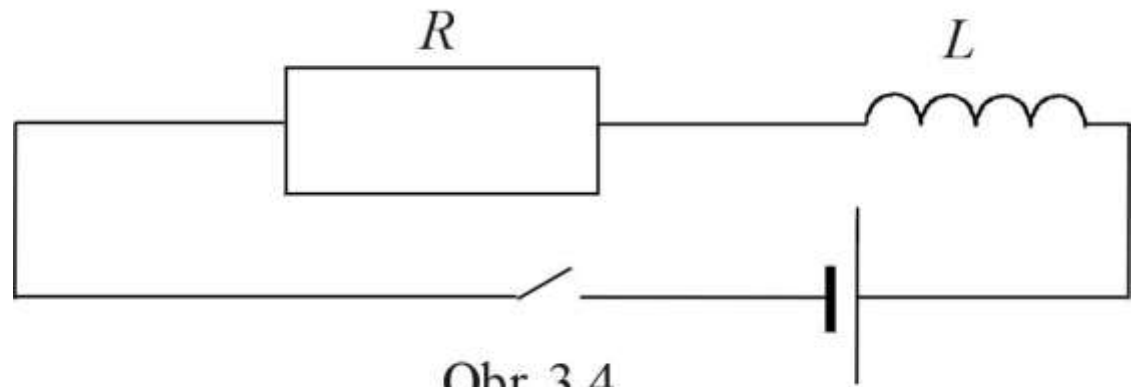
$$M_{12} = M_{21}$$

$$\Phi_1 = L_1 i_1 + M_{21} i_2$$

$$\mathcal{E}_1 = -\frac{d\Phi_1}{dt} = -L_1 \frac{di_1}{dt} - M_{12} \frac{di_2}{dt}$$



Obvod RL



$$Ri = \mathcal{E}_0 - L \frac{di}{dt}$$

$$L \frac{di}{dt} + Ri = \mathcal{E}_0$$

$$Li \frac{di}{dt} + Ri^2 = \mathcal{E}_0 i$$

$$p = ui = Li \frac{di}{dt}$$

$$dW = p dt = Li di$$

$$W = \int dW = \int_0^{i_m} Li di = \frac{1}{2} Li_m^2$$

$$W_m = \frac{1}{2} Li^2$$

Energie magnetického pole

energie magnetického pole solenoidu

$$L = \mu_0 \frac{N^2 S}{l}$$

$$W_m = \frac{1}{2} \mu_0 N^2 \frac{S}{l} i^2$$

$$B = \mu_0 \frac{Ni}{l}$$

hustota energie magnetického pole

$$W_m = \frac{1}{2} Li^2$$

$$W_m = \frac{1}{2} \frac{1}{\mu_0} B^2 Sl$$

$$w_m = \frac{dW_m}{dV} \quad w_m = \frac{1}{2} \frac{1}{\mu_0} B^2$$

energie magnetického pole

$$W_m = \int_V w_m dV$$