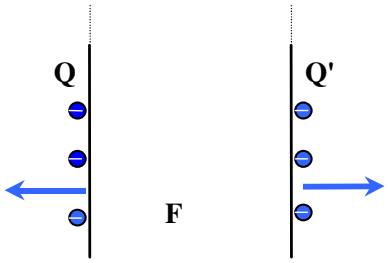
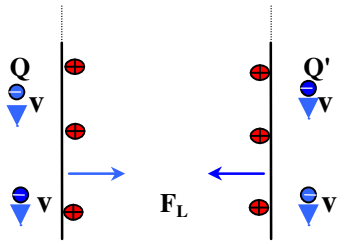
Konzultáció IV.

Weber-Kohlrausch

(1856)

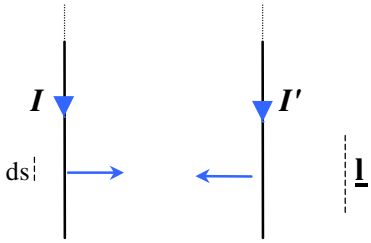




$\underline{F_L}=Q\,(\underline{v}\times\underline{B})$

$\underline{F}=Q\ \underline{E}$

$$F_{el}=\frac{1}{4\pi\varepsilon_o}\frac{QQ'}{r^2}$$



$\underline{F_L}=(I\,\underline{l}\times\underline{B})$

$$Ids=\frac{dQ}{dt}ds=dQ\,v \qquad \underline{Il}=Q\underline{v}$$

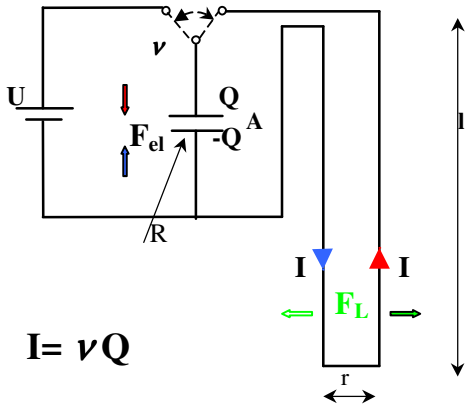
$$F_L=\frac{\mu_o}{4\pi}\frac{Ids\ I'ds'}{r^2}$$

$$F_{el}=\frac{1}{4\pi\varepsilon_o}\frac{QQ'}{r^2}$$

$$F_{mágn}=\frac{\mu_o}{4\pi}\frac{Qv\ Q'v}{r^2}$$

$$\frac{F_{mág}}{F_{el}}=\mu_o\varepsilon_o\,v^2$$

A kisérlet

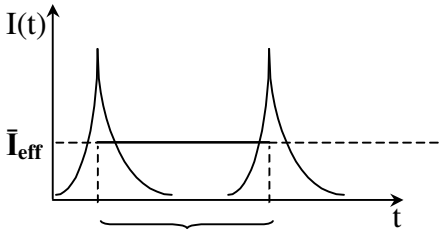


$$I = \nu Q$$

(Q=CU; C=ε_oA/d ; A=$R^2\pi$)

$$F_{el} = \frac{1}{2}QE = \frac{Q^2}{2\varepsilon_o A} \qquad F_L = BIl = \frac{\mu_o I^2}{2\pi r} l$$

Effektív áram



$\bar{I} = Q/T = 1/T \int I(t)\,dt$

$T_{kisüt}$ (=1/ν)

$F_L \sim \bar{I}^2$

$$\frac{F_{mág}}{F_{el}} = \frac{\mu_o\varepsilon_o (\nu Q)^2 l A}{\pi r Q^2} = \frac{\mu_o\varepsilon_o \nu^2 l R^2}{r} = \mu_o\varepsilon_o(\nu^2 \frac{l R^2}{r}) = \mu_o\varepsilon_o v^2$$

Weber-Kohlrausch formula

$$\mu_o \varepsilon_o c^2 = 1$$

mágnesség- elektromosság- fény $\Rightarrow$ ***Maxwell elmélet***

sztatika dinamika