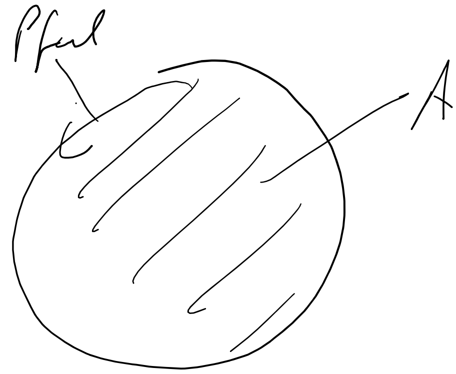
Induktion

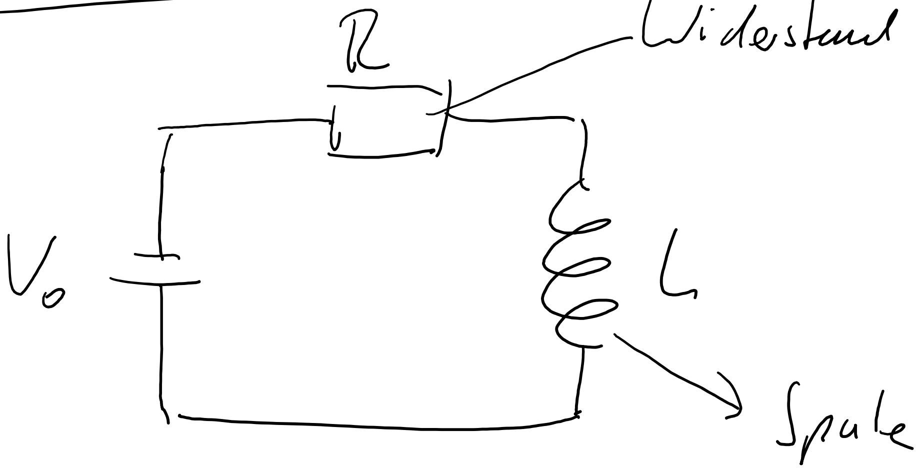
$$V_{ind} = -\frac{d\Phi_m}{dt} = \oint \vec{E}_{ind} \cdot d\vec{r}$$

Pfad um eingeschl. Fläche



$$\Phi_m = \int_A \vec{B} \cdot d\vec{A}$$

Stromkreise mit Spulen



$$V_0 - L\frac{dI}{dt} = RI$$

$$\frac{dI}{dt} = -\frac{RI}{L} + \frac{V_0}{L}$$

$$\boxed{\tau = \frac{L}{R}}$$

$$I_\infty = \frac{V_0}{R}$$

$$\frac{dI}{\ } = -\frac{1}{\ } I + \frac{I_\infty}{\ }$$

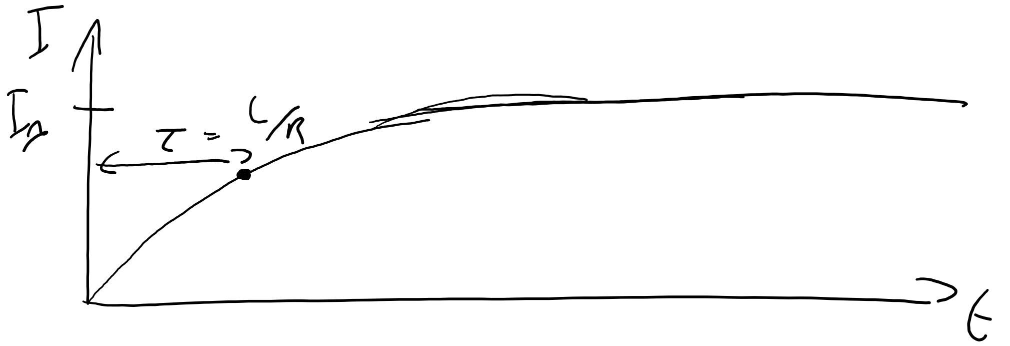
$$\frac{dI}{dt} = -\frac{1}{\tau} I + \frac{I_\infty}{\tau} \qquad I_\infty = \frac{V_0}{R}$$

$$\frac{dI}{dt} = \frac{1}{\tau}\left(I_\infty - I\right) \qquad I' = I_\infty - I$$

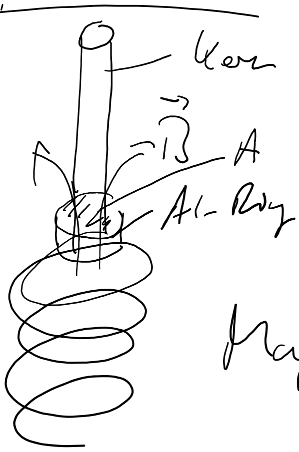
$$\frac{dI'}{dt} = -\frac{I'}{\tau} \qquad I'(t) = I'(0)\, e^{-t/\tau}$$

$$I_\infty - I(t) = I_\infty\, e^{-t/\tau}$$

$$I(t) = I_\infty\left(1 - e^{-t/\tau}\right)$$



Elihu-Thompson



Magnet-Spule

$$\Phi = B \cdot A$$

$$\frac{d\Phi}{dt} = \frac{dB}{dt} \cdot A$$

$$V_{ind} = -\frac{d\Phi}{dt} = -A\,\frac{dB}{dt}$$

$$I_{ind} = \frac{V_{ind}}{R} = -\frac{A}{R}\,\frac{dB}{dt}$$
