Extras 1

für sinusförmige Spannungen (z.B. $u(t) = \hat{u}\sin(t)$) gilt:

Effektivwert $U = \sqrt{\frac{1}{T}\int_0^T (\hat{u}\sin(t))^2 dt} = \sqrt{\frac{\hat{u}^2}{T}\int_0^T \sin^2(t) dt}$

$\boxed{\sin^2(x) = \frac{1}{2}(1-\cos(2x))}$

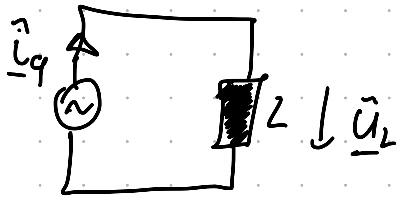
$= \sqrt{\frac{\hat{u}^2}{T}\int_0^T \frac{1}{2} - \frac{1}{2}\cos(2t) dt}$

$= \sqrt{\frac{\hat{u}^2}{T}\left(\frac{T}{2} - \frac{1}{2}\int_0^T \cos(2t) dt\right)}$

$= \sqrt{\frac{\hat{u}^2}{2T}\left(T - \underbrace{\left[\frac{\sin(2T)}{2}\right]_0^T}_{0}\right)} = \sqrt{\frac{\hat{u}^2}{2}} = \frac{\hat{u}}{\sqrt{2}}$

Frage:

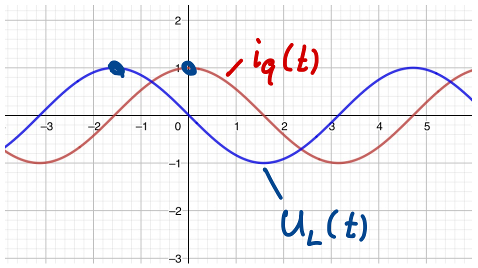
$\boxed{\text{gegeben: } i_q(t) = \hat{i}\cos(\omega t) \; (\rightarrow \underline{\hat{i}_q} = \hat{i}e^{j0°})}$



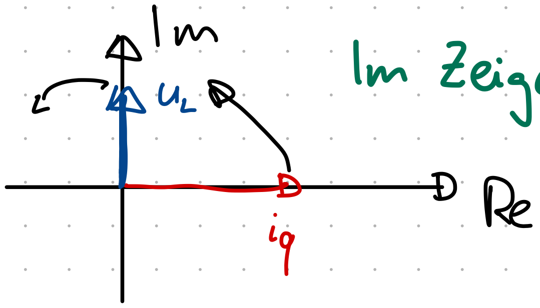
wie sieht $u_L(t)$ aus?

$u_L(t) = L\frac{di_q(t)}{dt} = L\hat{i}\frac{d}{dt}\cos(\omega t) = L\hat{i}\omega\,(\underbrace{-\sin(\omega t)}_{\cos(\omega t + \frac{\pi}{2})})$

$= L\hat{i}\omega\cos(\omega t + \frac{\pi}{2})$



↳ weiter Links in Plot



Im Zeigerdiagramm sieht man, dass der Strom nacheilt