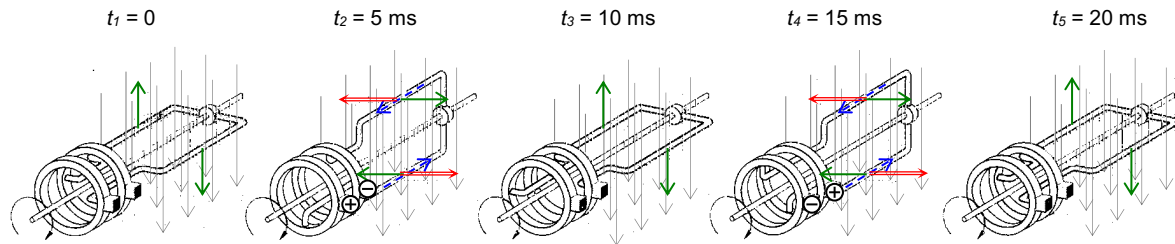


1. a) bis d) siehe Abbildung

a)  b)  d) 

e) $T = \underline{20 \text{ ms}}$

f) $f = \frac{1}{T} = \frac{1}{0.02 \text{ s}} = \underline{50 \text{ Hz}}$

g) $\omega = 2\pi f = 2\pi \cdot 50 \text{ Hz} = \underline{314 \text{ s}^{-1}}$

h) $\hat{U} = n \cdot A \cdot B \cdot \omega = 1 \cdot 0.0216 \text{ m}^2 \cdot 0.45 \text{ T} \cdot 314 \text{ s}^{-1} = \underline{3.05 \text{ V}}$

i) $U_{\text{eff}} = \frac{\hat{U}}{\sqrt{2}} = \frac{3.05 \text{ V}}{\sqrt{2}} = \underline{2.2 \text{ V}}$

2. a) $\hat{U} = 0.03 \text{ V} = \underline{30 \text{ mV}}$

b) zu den Zeiten $t = 0.05 \text{ s}, 0.15 \text{ s}, 0.25 \text{ s}, \text{ etc.}$ c) zu den Zeiten $t = 0, 0.10 \text{ s}, 0.20 \text{ s}, 0.30 \text{ s}, \text{ etc.}$

d) $T = \underline{0.20 \text{ s}}$

e) $f = \frac{1}{T} = \frac{1}{0.20 \text{ s}} = \underline{5.0 \text{ Hz}}$

f) $\omega = \frac{2\pi}{T} = \frac{2\pi}{0.20 \text{ s}} = \underline{31.4 \text{ s}^{-1}}$

g) $B = \frac{U}{n \cdot A \cdot \omega} = \frac{0.030 \text{ V}}{182 \cdot (0.5 \text{ m})^2 \cdot 2\pi \cdot 5.0 \text{ Hz}} = \underline{2.1 \cdot 10^{-5} \text{ T}}$

3. a) $\omega = 2\pi f = 2\pi \cdot 15 \text{ Hz} = \underline{94.2 \text{ s}^{-1}}$

$$\hat{U} = n \cdot A \cdot B \cdot \omega = 100 \cdot 0.020 \text{ m}^2 \cdot 0.20 \text{ T} \cdot 94.2 \text{ s}^{-1} = \underline{37.7 \text{ V}}$$

b) $U(t) = \hat{U} \cdot \sin(\omega \cdot t) \Rightarrow \sin(\omega \cdot t) = \frac{U(t)}{\hat{U}}$

$$\alpha_1 = \omega \cdot t = \arcsin\left(\frac{U(t)}{\hat{U}}\right) = \arcsin\left(\frac{18.3 \text{ V}}{37.7 \text{ V}}\right) = \underline{0.51} \quad \alpha_2 = \pi - \alpha_1 = \pi - 0.51 = \underline{2.63}$$

$$\alpha_3 = \alpha_1 + 2\pi = 0.51 + 2\pi = \underline{6.79}$$

$$\alpha_4 = \alpha_2 + 2\pi = 2.63 + 2\pi = \underline{8.91} \quad \text{etc.}$$

c) $t_1 = \frac{\alpha}{\omega} = \frac{0.51}{94.2 \text{ s}^{-1}} = 0.00538 \text{ s} = \underline{5.38 \text{ ms}}$

$$t_2 = \frac{\alpha}{\omega} = \frac{2.63}{94.2 \text{ s}^{-1}} = 0.0280 \text{ s} = \underline{28.0 \text{ ms}}$$

$$t_3 = t_1 + T = 5.38 \text{ ms} + 66.7 \text{ ms} = \underline{72.0 \text{ ms}}$$

$$t_4 = t_2 + T = 28.0 \text{ ms} + 66.7 \text{ ms} = \underline{94.7 \text{ ms}}$$

etc.

4. a) $\hat{U} = \underline{325 \text{ V}}$

b) $T = \underline{0.020 \text{ s}}$

c) $f = \frac{1}{T} = \frac{1}{0.020 \text{ s}} = \underline{50 \text{ Hz}}$

$$\omega = \frac{2\pi}{T} = \frac{2\pi}{0.020 \text{ s}} = \underline{314 \text{ s}^{-1}}$$

d) $U_{\text{eff}} = \frac{\hat{U}}{\sqrt{2}} = \frac{325 \text{ V}}{\sqrt{2}} = \underline{230 \text{ V}}$

e) $\hat{I} = \frac{\hat{U}}{R} = \frac{325 \text{ V}}{882 \Omega} = \underline{0.37 \text{ A}}$

$$I_{\text{eff}} = \frac{U_{\text{eff}}}{R} = \frac{230 \text{ V}}{882 \Omega} = \underline{0.26 \text{ A}}$$

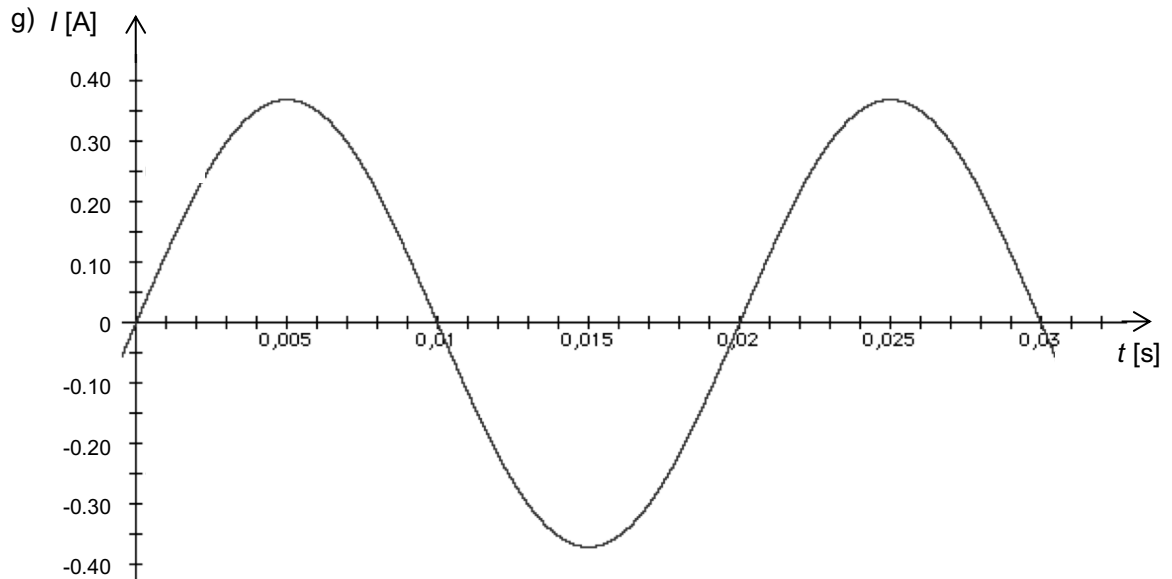
f) $I(0) = \hat{I} \cdot \sin(\omega t) = 0.37 \text{ A} \cdot \sin(314 \text{ s}^{-1} \cdot 0) = \underline{0}$

$$I(0.0050 \text{ s}) = \hat{I} \cdot \sin(\omega t) = 0.37 \text{ A} \cdot \sin(314 \text{ s}^{-1} \cdot 0.0050 \text{ s}) = \underline{0.37 \text{ A}}$$

$$I(0.010 \text{ s}) = \hat{I} \cdot \sin(\omega t) = 0.37 \text{ A} \cdot \sin(314 \text{ s}^{-1} \cdot 0.010 \text{ s}) = \underline{0}$$

$$I(0.015 \text{ s}) = \hat{I} \cdot \sin(\omega t) = 0.37 \text{ A} \cdot \sin(314 \text{ s}^{-1} \cdot 0.015 \text{ s}) = \underline{-0.37 \text{ A}}$$

$$I(0.020 \text{ s}) = \hat{I} \cdot \sin(\omega t) = 0.37 \text{ A} \cdot \sin(314 \text{ s}^{-1} \cdot 0.020 \text{ s}) = \underline{0}$$



h) $\hat{P} = \hat{U} \cdot \hat{I} = 325 \text{ V} \cdot 0.37 \text{ A} = \underline{120 \text{ W}}$ $P_{\text{eff}} = U_{\text{eff}} \cdot I_{\text{eff}} = 230 \text{ V} \cdot 0.26 \text{ A} = \underline{60 \text{ W}}$

i) $P(0) = \hat{P} \cdot \sin^2(\omega t) = 120 \text{ W} \cdot \sin^2(314 \text{ s}^{-1} \cdot 0) = \underline{0}$

$$P(0.0050 \text{ s}) = \hat{P} \cdot \sin^2(\omega t) = 120 \text{ W} \cdot \sin^2(314 \text{ s}^{-1} \cdot 0.0050 \text{ s}) = \underline{120 \text{ W}}$$

$$P(0.010 \text{ s}) = \hat{P} \cdot \sin^2(\omega t) = 120 \text{ W} \cdot \sin^2(314 \text{ s}^{-1} \cdot 0.010 \text{ s}) = \underline{0}$$

$$P(0.015 \text{ s}) = \hat{P} \cdot \sin^2(\omega t) = 120 \text{ W} \cdot \sin^2(314 \text{ s}^{-1} \cdot 0.015 \text{ s}) = \underline{120 \text{ W}}$$

$$P(0.020 \text{ s}) = \hat{P} \cdot \sin^2(\omega t) = 120 \text{ W} \cdot \sin^2(314 \text{ s}^{-1} \cdot 0.020 \text{ s}) = \underline{0}$$

