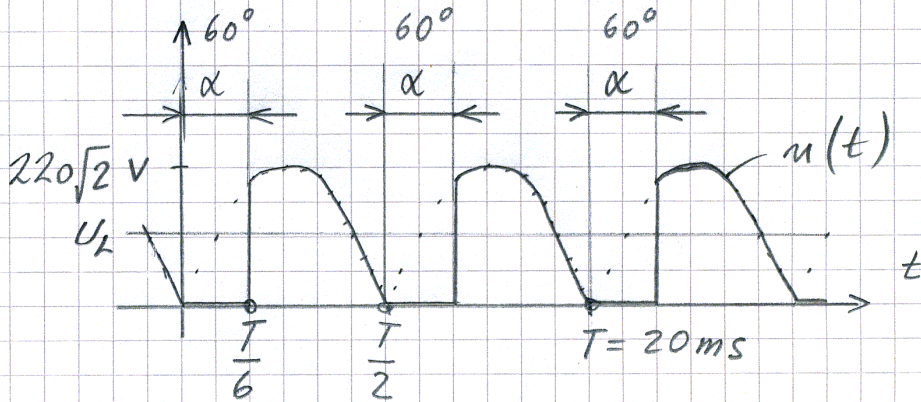
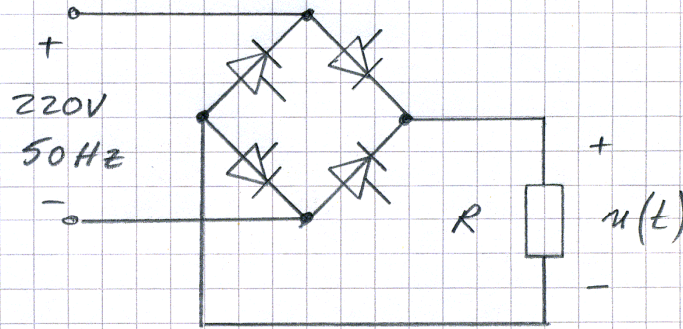


9.3



$$\begin{aligned}
 a) \quad \alpha = 0 &\Rightarrow U_L = \frac{1}{T} \int_0^T u(t) dt = \\
 &= \frac{2}{T} \int_0^{\frac{T}{2}} 220\sqrt{2} \sin(\omega t) dt = \\
 &= \left| T = \frac{2\pi}{\omega} \right| = \frac{200}{2\pi} \cdot 220\sqrt{2} \left[\frac{-\cos(\omega t)}{\omega} \right]_0^{\frac{\pi}{\omega}} =
 \end{aligned}$$

$$\approx 198 V$$

$$\alpha = 180^\circ \Rightarrow U_L = 0$$

$$0 < U_L < 198 V$$

$$b) \alpha = 60^\circ \rightarrow$$

$$U_L = \frac{1}{T} \int_0^T u(t) dt =$$

$$= \frac{2}{T} \int_{\frac{T}{6}}^{\frac{T}{2}} 220\sqrt{2} \sin(\omega t) dt =$$

$$= \frac{2\omega}{2\pi} \int_{\frac{\pi}{3\omega}}^{\frac{\pi}{\omega}} 220\sqrt{2} \sin(\omega t) dt =$$

$$= \frac{2\omega}{2\pi} \cdot 220\sqrt{2} \left[\frac{-\cos(\omega t)}{\omega} \right]_{\frac{\pi}{3\omega}}^{\frac{\pi}{\omega}} =$$

$$= \frac{220\sqrt{2}}{\pi} \left[-\cos \pi + \cos \frac{\pi}{3} \right] \approx \underline{149 \text{ V}}$$