

Kurzlösungen 05

Aufgabe 23:

a) $u_0(t) = u_1(t) + u_2(t) + u_3(t)$

$$u_0(t) = \frac{U_0}{2T_A} \cdot (t \cdot s(t) - (t - 2T_A) s(t - 2T_A))$$

b) $u_{21}(t) = \frac{U_0}{T_A} \cdot \left(\frac{1}{p_2 - p_1} \cdot [(p_2 \cdot RC + 1) e^{p_1 t} - (p_1 \cdot RC + 1) \cdot e^{p_2 t}] + t - RC \right) \cdot s(t)$

$$\text{mit } p_{1,2} = -\frac{R}{2L} \pm \sqrt{\left(\frac{R}{2L}\right)^2 - \frac{1}{LC}}$$

c) $u_3(t) = \frac{U_0}{2T_A} \left(\frac{(p_2 RC + 1) e^{p_1(t-2T_A)} - (p_1 RC + 1) e^{p_2(t-2T_A)}}{p_2 - p_1} + (t - 2T_A) - RC \right) \cdot s(t - 2T_A)$

d) $\frac{V_{01}(b)}{2} \cdot (1 - e^{-p_2 2T_A}) = \frac{U_0}{2T_A p_2} (1 - e^{-p_2 2T_A})$

e) $V_2(p) = \frac{U_0}{2T_A LC} (1 - e^{-p 2T_A}) \frac{1}{p^2(p - p_1)(p - p_2)}$

f) $V_2(p) = \frac{U_0}{2T_A LC} \left(\frac{I}{p} + \frac{K}{p^2} + \frac{L}{p - p_1} + \frac{M}{p - p_2} \right)$

$$\text{mit: } \underline{K} = \frac{1}{p_1 p_2}, \quad \underline{I} = \frac{p_1 + p_2}{(p_1 p_2)^2}, \quad \underline{L} = \frac{1}{p_1^2 (p_1 - p_2)}, \quad \underline{M} = \frac{1}{p_2^2 (p_2 - p_1)}$$

Aufgabe 24

$$a) \cdot I_{L0} = \frac{U_0}{R_1}, \quad U_{L0} = U_0$$

$$b) \underline{U}_C(p) = \frac{U_0 \left(p + \frac{1}{CR_1}\right)}{p^2 + p \frac{1}{CR} + \frac{1}{LC}}$$

$$c) u_2(t) = U_0 \frac{\sqrt{b^2 + \omega^2}}{\omega} \cdot e^{bt} \cos(\omega t - \arctan \frac{b}{\omega})$$

$$d) t_k = \frac{1}{\omega} \arctan \frac{b}{\omega} + \frac{\pi}{2\omega} + \frac{\pi k}{\omega}, \quad k \in \mathbb{N}_0$$

$$e) u_c(t) = \frac{I_{L1} R_1}{C(R_1 + R_2)} (t - t_1) \cdot e^{b'(t - t_1)} \cdot s(t - t_1), \quad t > t_1$$

$$f) R_2 \approx 64,25 \, \Omega$$