

Lösungsvorschlag Übung 9 - Transformator

$$1. \quad \ddot{u} = \frac{U_1}{U_2} = \frac{230V}{21.1V} = \underline{19}$$

$$2. \quad I_1 = \frac{I_2}{\ddot{u}} = \frac{20A}{19} = \underline{1.05A}$$

$$3. \quad R_2' = R_2 \ddot{u}^2 = 0.01\Omega \cdot 19^2 = \underline{3.61\Omega}$$

$$4. \quad P_V = P_{V1} + P_{V2} = R_1 |I_1|^2 + R_2 |I_2|^2 = 0.5\Omega \cdot 1.05^2 A^2 + 0.01\Omega \cdot 20^2 A^2 = 0.55W + 4W = \underline{4.55W}$$

$$5. \quad u_k U_{1nenn} = 18.4V \quad u_k = \frac{18.4V}{U_{1nenn}} = \frac{18.4V}{230V} = \underline{8\%}$$

$$6. \quad u_k U_{1nenn} = |Z| \cdot I_{1nenn} = \sqrt{(R_1 + R_2')^2 + (\omega L_{1\sigma} + \omega L_{2\sigma}')^2} \cdot I_{1nenn}$$

$$L_{1\sigma} + L_{2\sigma}' = \frac{1}{\omega} \sqrt{\left(\left(\frac{u_k U_{1nenn}}{I_{1nenn}} \right)^2 - (R_1 + R_2')^2 \right)} = \frac{1}{(2\pi 50)} \sqrt{\left(\left(\frac{18.4}{1.05} \right)^2 - (0.5 + 3.61)^2 \right)} = 54.2[mH]$$

$$L_{1\sigma} = L_{2\sigma}' = \underline{27.1[mH]}$$

$$7. \quad L_h + L_{1\sigma} = \frac{U_{1nenn}}{\omega I_{10}} = \frac{230V}{2\pi 50 \cdot 0.1A} = 7.32H$$

$$L_h = 7.32H - 0.027H = \underline{7.29H}$$