

task_ezrkjzifcegttcpc_with_calculation

Student Group

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resonance, resonant circuit, RMS, power, exam ee2 SS2021

Exercise E1 Resonant Circuit

(written test, approx. 4 % of a 120-minute written test, SS2021)

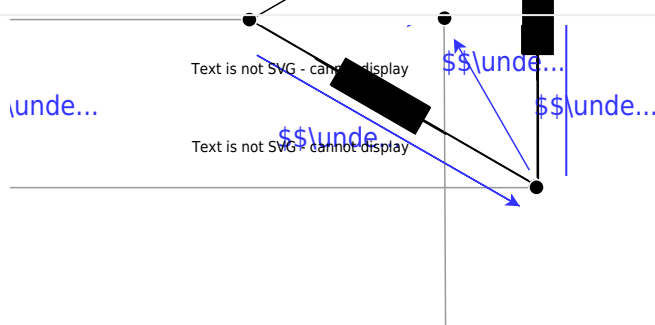
Specify the RMS value of the phase voltage U_{eff} and the winding voltage U_{eff} .
Result: Be considered in the following.

A voltage with the RMS value $U_{\text{eff}} = 110 \text{ V}$ is applied between the terminals of each winding.

Through each of the windings, there is a current with an RMS value $I_{\text{eff}} = 5 \text{ A}$ and a phase shift $\varphi = \pm 25^\circ$ compared to the voltage.

a) Draw the circuit diagram.
Since the given $U_{\text{eff}} = 110 \text{ V}$ is applied between each winding, this is also the RMS value of the winding voltage U_{eff} .
For the power $P = 3 \cdot 110 \text{ V} \cdot 5 \text{ A} \cdot \cos(25^\circ) = 1410.888 \text{ W}$ must be zero: $\sum P_i = 0$.

By this (and showing in the example in the image below), One can see, that $I_{\text{eff}} = \sqrt{3} \cdot I_{\text{eff}} = \sqrt{3} \cdot 5 \text{ A}$



one single phase as an example



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