

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)

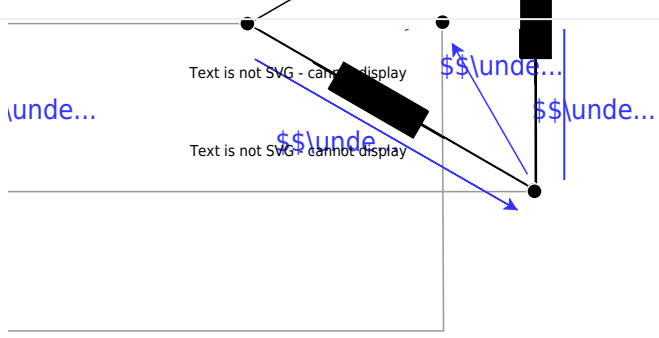
Specify the RMS value of the phase voltage U_{ph} and the winding voltage U_{w} .
Results to be considered in the following.

A voltage with the RMS value $U_{\text{RMS}} = 110 \text{ V}$ is applied between the terminals
Path

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

Since $P_{\text{res}} = 0$, $\sum P_i = 0$.
a) Draw the circuit diagram.
This analysis power $P_{\text{res}} = 0$ is given by $P_{\text{res}} = \sum U_i I_i \cos(\varphi_i)$
For a single phase $P_{\text{res}} = 3 \cdot U_{\text{ph}} I_{\text{RMS}} \cos(\varphi) = 0$ (with $\varphi = 25^\circ$)
For a single phase $P_{\text{res}} = 3 \cdot U_{\text{ph}} I_{\text{RMS}} \cos(\varphi) = 0$ (with $\varphi = 25^\circ$)
Results must be zero: $\sum P_i = 0$.

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



one single phase as an example



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