

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)

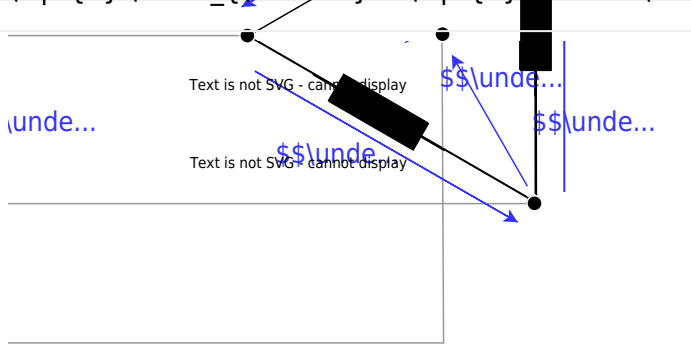
Specify the RMS value of the phase voltage U_{ph} and the resulting voltage U_{rms} .
Results be considered in the following.

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

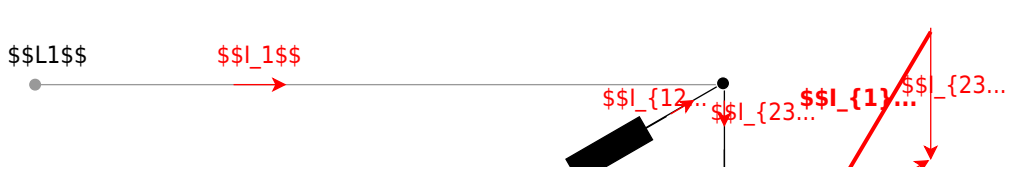
Through each of the windings, there is a current with an RMS value $I_{\text{RMS}} = 5 \text{ A}$
and a phase $\varphi = \pm 25^\circ$ compared to the voltage.

Since $P_{\text{res}} = 0$, $U_{\text{ph}} = 110 \text{ V}$ is applied through each winding,
this also power $P_{\text{res}} = 0$ is given by $P_{\text{res}} = U_{\text{ph}} \cdot I_{\text{RMS}} \cdot \sin(\varphi)$
For initial case $P_{\text{res}} = 0$ at $\varphi = 0^\circ$ or $\varphi = 180^\circ$ (in $\sin(0^\circ) = 0$ or $\sin(180^\circ) = 0$)
Resonance must be zero: $P_{\text{res}} = 0$.

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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