

task_uzbbnoz8abe6201d_with_calculation

Student Group

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Exercise E16 Impedances at Frequencies (written test, approx. 14 % of a 60-minute written test, SS2023)

At an impedance with $Z = 50 - j10 \Omega$ a voltage $u(t) = 100 \cos(1000t) \text{ V}$ is applied. The current $i(t)$ is measured with $i(t) = I_m \sin(\omega t + \phi) \text{ A}$. $I_m = 1.6 \text{ A}$.

1. An inductor with $X_{L1} = 60 \text{ m}\Omega$ and $L_1 = 15.9 \mu\text{H}$.

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Solution
Solution
\begin{align*} f_0 = 1000 \text{ Hz} \quad \omega = 1000 \text{ rad/s} \end{align*}

\begin{align*} X_{L1} &= \omega L_1 = 1000 \cdot 15.9 \cdot 10^{-6} = 15.9 \text{ m}\Omega \\ X_{C1} &= \frac{1}{\omega C_1} = \frac{1}{1000 \cdot 10^{-6}} = 1000 \Omega \end{align*}

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