task_9xy69axg3gi3nr26_with_calculation

Student Group

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complex voltage divider, exam ee2 SS2021

Exercise E18 Complex series circuit
(written test, approx. 8 % of a 120-minute written test, SS2021)

A series circuit of $C = 4.95$ nF, $R = 200$ Ω and $f = 40$ kHz shall be investigated.

a) Determine the complex impedance $\underline{Z}_C$.

Result

$\underline{Z}_C = -{\rm j} \cdot 804 ~\rm \Omega $

Path

The complex impedance $\underline{Z}_C$ is given as \begin{align*} \underline{Z}_C &= {{1}\over{{\rm j} \cdot 2\pi \cdot f \cdot C }} \\ &= {{-{\rm j}}\over{2\pi \cdot 40 \cdot 10^3 ~\rm Hz \cdot 4.95 \cdot 10^{-9} ~\rm F }} \\ &= -{\rm j} \cdot 803.81... ~\rm \Omega \\ \end{align*}

Based on the diagram: $|\underline{Z}|= 828 ~\Omega$