

Pre-Lab 2 Single-Phase System with RLC Load

A series RLC circuit is supplied by a sinusoidal 60-Hz voltage source $V=150\cos(\omega t)$ where ω = angular speed = $2\pi f$, with f as frequency. If the values of R , L , and C are, respectively, $10\ \Omega$, $10\ \text{mH}$, and $1\ \text{mF}$.

Using steady-state analysis, calculate:

1. The total complex impedance \mathbf{Z} .
2. Inductive Reactance X_L .
3. Capacitive Reactance X_C .
4. Total complex impedance Z .
5. Current in the circuit I
6. Power factor of the circuit pf
7. Real power consumed by the circuit P
8. Reactive power of the circuit Q
9. Apparent power, $|S|$
10. Draw phasor diagram of V and I .