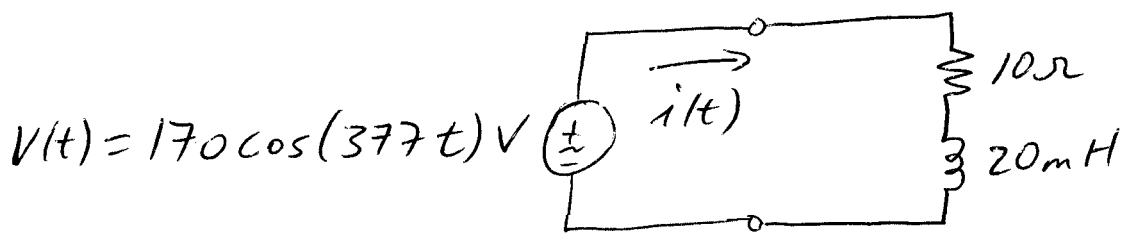


Example- For the time-domain circuit shown, determine the complex, apparent, real, and reactive powers as well as the power factor.



↓ phasor equivalent

$$\bar{V} = \frac{170}{\sqrt{2}} \angle 0^\circ = 120.208 \angle 0^\circ \text{ V}_{rms}$$

$$\bar{Z} = 10 + j377(20 \times 10^{-3})$$

$$= 10 + j7.54 \, \Omega$$

$$= 12.524 \angle 37.0163^\circ \, \Omega$$



$$\bar{I} = \frac{\bar{V}}{\bar{Z}} = \frac{120.208 \angle 0^\circ}{12.524 \angle 37.0163^\circ} = 9.5982 \angle -37.0163^\circ \text{ A}$$

$$\bar{S} = \bar{V} \bar{I}^* = (120.208 \angle 0^\circ)(9.5982 \angle -37.0163^\circ)^* = 1153.78 \angle 37.02^\circ \text{ VA}$$

$$\bar{S} = 921.253 + j694.625 \text{ VA}$$

← convert to rectangular format

$$S = VI = |\bar{S}| = 1153.78 \text{ VA}$$

$$P = 921.253 \text{ W}$$

$$Q = 694.625 \text{ VAR} \quad (Q > 0) \rightarrow$$

$$PF = \frac{P}{S} = \cos \theta = \frac{921.253}{1153.78} = \cos(37.0163^\circ) = \underline{\underline{0.7985 \text{ lagging}}}$$