Current Follow-Up

Consider the harmonically driven series LCR circuit shown.

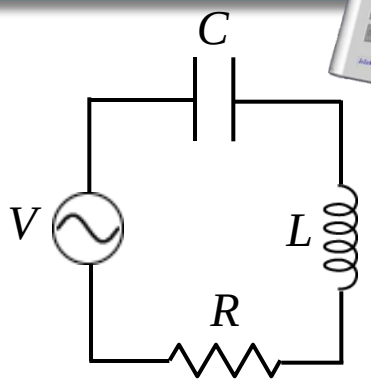
$V_{max} = 100\ V$

$I_{max} = 2\ mA$

$V_{Cmax} = 113\ V\ (= 80\ \text{sqrt}(2))$ → $X_C = 40\sqrt{2}\ k\Omega$

The current leads generator voltage by 45^o (cos = sin = 1/sqrt(2))

L and R are unknown.



$R = 25\sqrt{2}\ k\Omega$

$X_L = 15\sqrt{2}\ k\Omega$

$\omega_0 = \sqrt{\frac{8}{3}}\,\omega$

What is the maximum current at resonance

A) $I_{\max}(\omega_0) = \sqrt{2}\,mA$

B) $I_{\max}(\omega_0) = 2\sqrt{2}\,mA$

C) $I_{\max}(\omega_0) = \sqrt{\frac{8}{3}}\,mA$

At resonance $X_L = X_C$ → $Z = R$ → $I_{\max}(\omega_0) = \frac{V_{\max}}{R} = \frac{100}{25\sqrt{2}} = 2\sqrt{2}\,mA$