$$V \cos \omega t = R.I \left[\cos\varphi . \cos\omega t - \text{sen}\,\varphi . \text{sen}\,\omega t\right] - \omega L I \left[\text{sen}\,\varphi . \cos\omega t + \cos\varphi . \text{sen}\,\omega t\right]$$

$$\begin{cases} V = R.I.\cos\varphi - \omega L I\, \text{sen}\,\varphi \\ 0 = -RI\, \text{sen}\,\varphi - \omega L I \cos\varphi \end{cases}$$

$$\begin{cases} (1)\quad V = RI\cos\varphi - \omega L I\,\text{sen}\,\varphi = (R\cos\varphi - \omega L\,\text{sen}\,\varphi)\, I \\ (2)\quad 0 = R\,\text{sen}\,\varphi + \omega L\cos\varphi \end{cases}$$

De (2) obtengo $-\dfrac{\text{sen}\,\varphi}{\cos\varphi} = \dfrac{\omega L}{R} \Rightarrow \text{tg}\,\varphi = -\dfrac{\omega L}{R} \Rightarrow \boxed{\varphi = -\text{artg}\,\dfrac{\omega L}{R}}$

Haciendo cuentas en (1) $\dfrac{V^2}{I^2} = \left[R^2\cos^2\varphi - 2R\cos\varphi\,\omega L\,\text{sen}\,\varphi + (\omega L)^2\text{sen}^2\varphi\right]$

luego $V^2 = \left\{\left[R^2 + (\omega L)^2\right]\cos^2\varphi + (\omega L)^2\right\} I^2$