7.27 An electrical device draws 2kW power from AC mains (voltage 223V (rms) = 50,000 V). The current differs (lags) in phase by φ (tan φ = -3/4) as compared to voltage. Find (i) R, (ii) XC – XL, and (iii) IM. Another device has twice the values for R, XC and XL. How are the answers affected?

Answer:

Impedance = Z = 25 ohms

$635 = 25R^2/16$

a) Resistance = R = $\sqrt{25 \times 16} = \sqrt{400} = 20$ ohms

b) Xc – Xl = -3R/4 = -15 ohms

c) Main current = Im = 12.6 A