Chapter 9, Solution 29.

Given that $v_C(0)$ = 2cos(155°) V, what is the instantaneous voltage across a 2-μF capacitor when the current through it is $I = 4 \sin(10^6 t + 25°)$ A?

Solution

$$Z = \frac{1}{j\omega C} = \frac{1}{j\left(10^6\right)\left(2\times10^{-6}\right)} = -j\,0.5$$

$$V = IZ = \left(4\angle 25°\right)\left(0.5\angle -90°\right) = 2\angle -65°$$

Therefore v(t) = **2 sin(10^{6}t – 65) V**.