

Electrical Power Engineering Fundamentals

Departamento de Ingeniería Eléctrica. Universidad Carlos III de Madrid

Module 3. Analysis of AC Circuits. Week 5

Exercise 1. In the circuit below, find the current $i(t)$ and the voltage $U_x(t)$:

$$U_g(t) = 10\sqrt{2}\cos(10t) \text{ V}$$

$$I_g(t) = 10\sin(10t + 45^\circ) \text{ A}$$

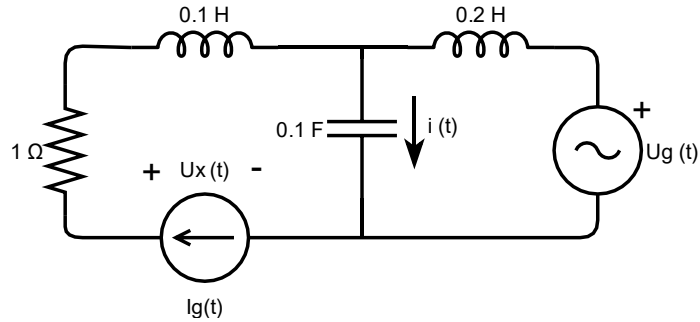


Figure 1 AC circuit 1

Solution: $i(t) = 10\sqrt{10}\cos(10t - 63.43^\circ) \text{ A}$; $U_x(t) = 20\cos(10t - 135^\circ) \text{ V}$

Exercise 2. In the following circuit, find $U_r(t)$:

$$U_g(t) = 2\sqrt{2}\sin(1000t + 180^\circ) \text{ V}$$

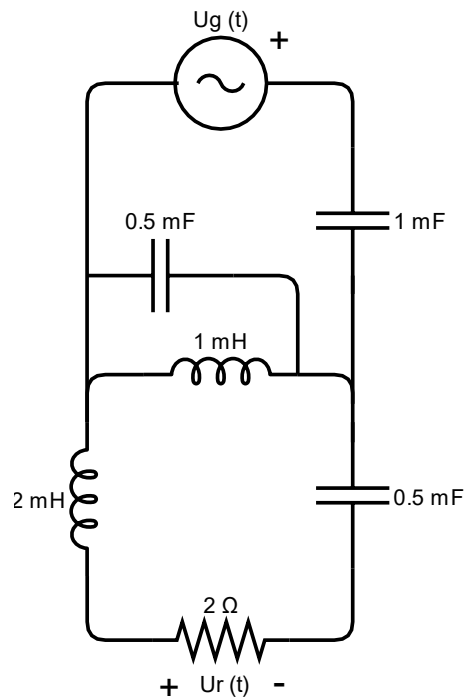


Figure 2. AC circuit 2

Solution: $U_r(t) = 4\sin(1000t + 45^\circ) \text{ V}$

Exercise 3. In the circuit below, find $U_{AB}(t)$:

$$U_g(t) = 2\sqrt{2}\cos(2t) \text{ V}$$

$$I_g(t) = \sqrt{2}\cos(2t + 90^\circ) \text{ A}$$

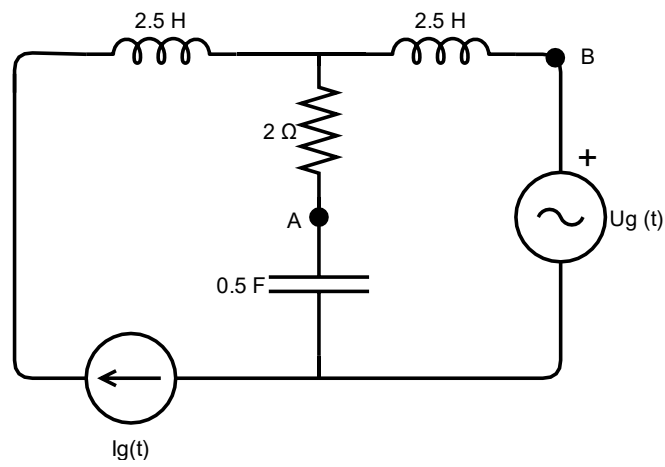


Figure 3. AC circuit 3

Solution: $U_{AB} = 2.02\cos(2t+167.9^\circ) \text{ V}$

Exercise 4. In the circuit below, find voltage $U_c(t)$:

$$U_g(t) = 5\sqrt{2}\sin(2t) \text{ V}$$

$$I_{g1}(t) = 20\sin(2t - 45^\circ) \text{ A}$$

$$I_{g2}(t) = 2\sqrt{2}\cos(2t) \text{ A}$$

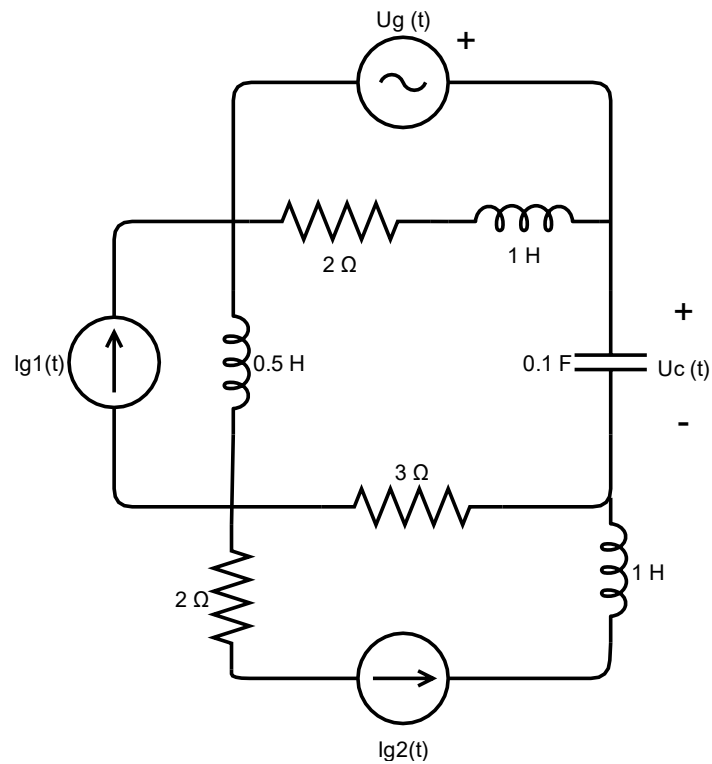


Figure 4 AC circuit 4

Solution: $U_c(t) = 15.52\sqrt{2}\sin(2t - 21.94^\circ) \text{ V}$