Electrical Power Engineering Fundamentals

Departamento de Ingeniería Eléctrica. Universidad Carlos III de Madrid

Module 4. Three-phase AC Systems. Week 9

Exercise 1. The following circuit shows a balanced three-phase AC system. (A, B, C) is a direct sequence. Find the current I_C and the voltage $U_{B'C'}$.

$U_{AB}=400\angle 0°$ V

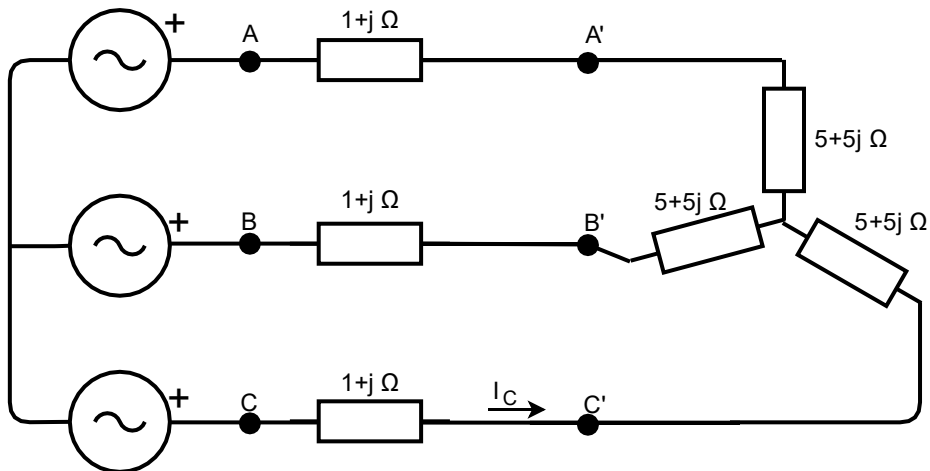Figure 1. Three-phase AC system 1

Solution: $I_C = 27.21\angle 45°$ A; $U_{B'C'} = 333.24\angle -120°$ V

Exercise 2. The following circuit shows a balanced three-phase AC system. (A, B, C) is a direct sequence. Find:
a) the currents $I_{A''}$ and I_C; b) the voltages $U_{A'B'}$ and $U_{C''N}$

$U_{BC} = 400\angle 30°$ V

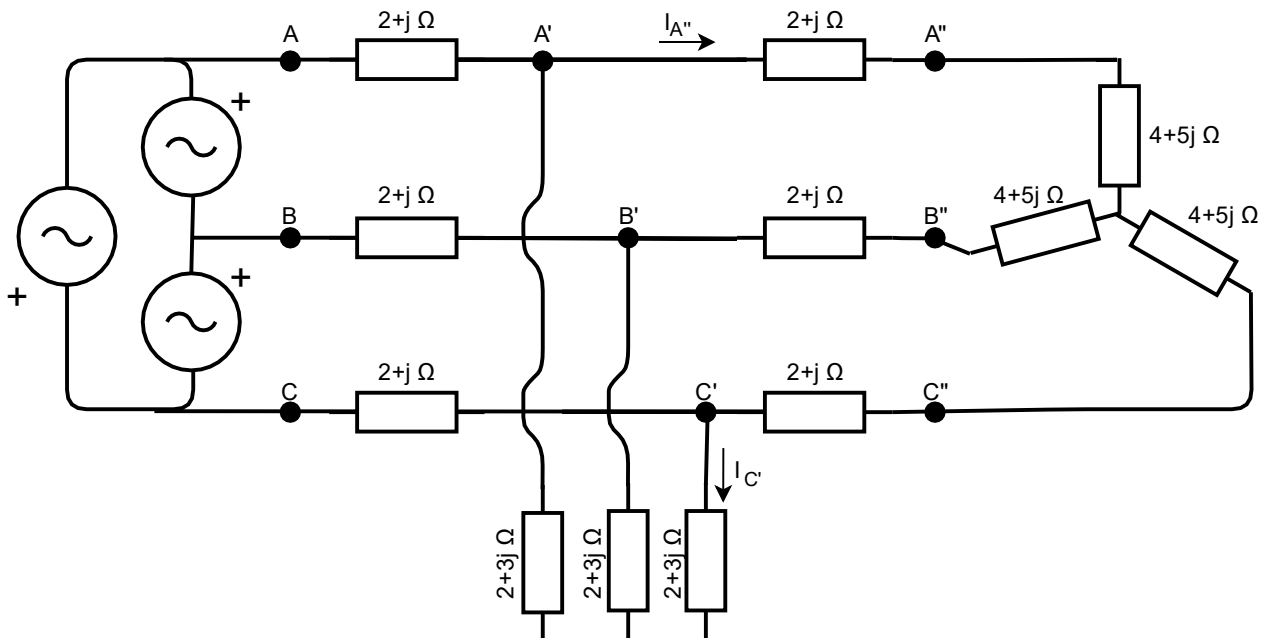Figure 2. Three-phase AC system 2

Solution: a) $I_{A''} = 14.867\angle 87.33°$ A; $I_C = 34.99\angle -163.98°$ A; b) $U_{A'B'} = 218.5\angle 162.33°$ V; $U_{C''N} = 95.19\angle -101.33°$ V

Exercise 3. The following figure shows a balanced three-phase AC system. (A, B, C) is a direct sequence. Find the line voltage U_{BC} and the line current I_B, knowing that the voltage $U_{A'B'} = 220\angle 0°$ V.

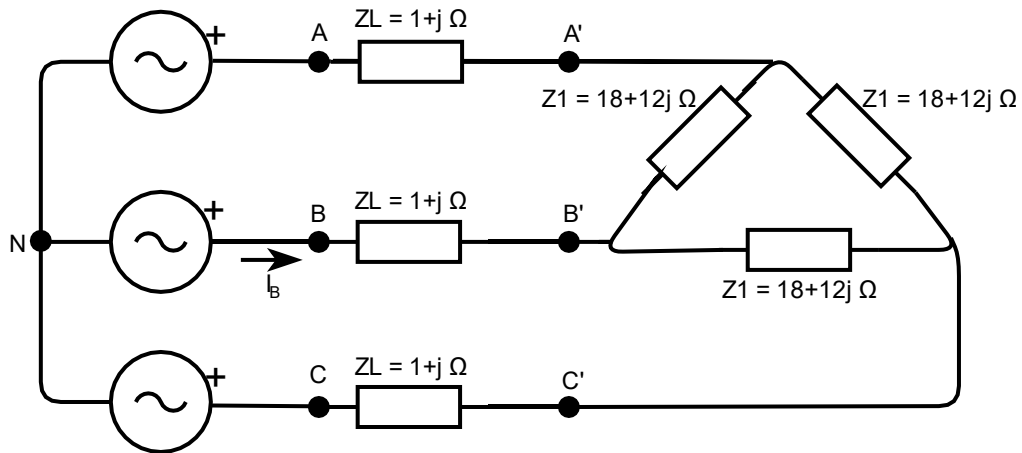Figure 3. Three-phase AC system 3

Solution: $U_{BC} = 262.38\angle -118.15°$ V; $I_B = 17.61\angle -183.69°$ A

Exercise 4. The following circuit shows a balanced three-phase AC system. (A, B, C) is a direct sequence. Find the voltage u2, knowing that the voltage $u1 = 100\angle 0°$ V.
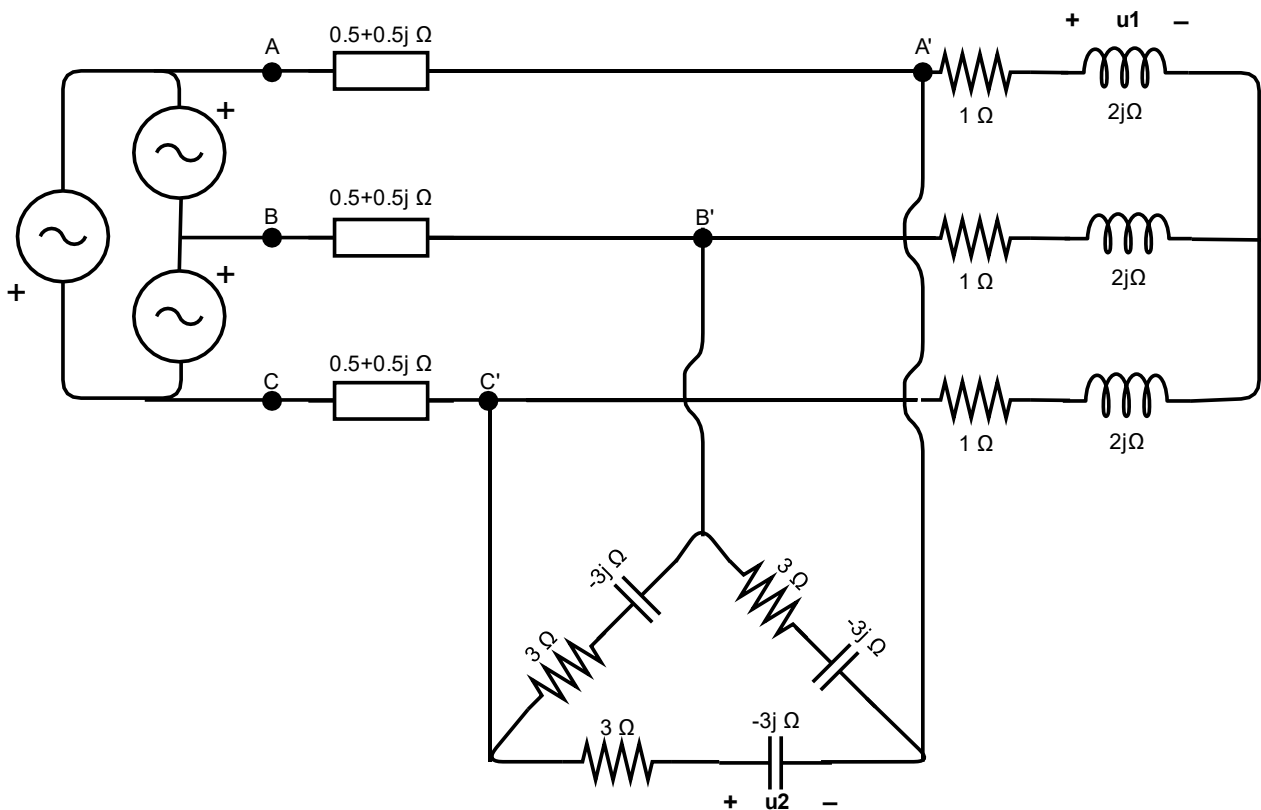

Figure 4. Three-phase AC system 4

Solution: u2 = 136.93∠ 78.44° V

Prof.: Francisco Arredondo. farredon@ing.uc3m.es