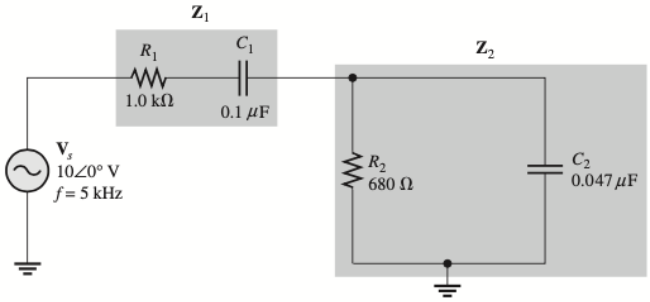
Aportaciones Trabajo de Investigación #2

- En el circuito serie – paralelo determinar los siguientes literales:

1. Impedancia Total
2. Corriente total
3. Angulo de fase en la cual I_{tot} adelanta a V_s

1. 

$$X_{C1} = \frac{1}{2\pi fC} = \frac{1}{2\pi(5kHz)(0.1\mu F)} = 318[Ohm]$$

$$X_{C2} = \frac{1}{2\pi fC} = \frac{1}{2\pi(5kHz)(0.047\mu F)} = 677[Ohm]$$

$$Z_1 = R_1 - jX_{C1} = 1.0\ [kOhm] - j318\ [Ohm]$$

$$G2 = \frac{1}{R_2} = \frac{1}{680\ [Ohm]} = 1.47\ mS$$

$$B_{C2} = \frac{1}{X_{C2}} = \frac{1}{677[Ohm]} = 1.48\ mS$$

$$Y_2 = G_2 + jB_{C2} = 1.47\ mS + j1.48\ mS$$

$$Y_2 = \sqrt{G_2^2 + B_{C2}^2} < \tan^{-1}\left(\frac{B_{C2}}{G_2}\right) = \sqrt{(1.47\ mS)^2 + (1.48\ mS)^2}$$
$$< \tan^{-1}\left(\frac{1.48\ mS}{1.47\ mS}\right) = 2.09 < 45.2°\ mS$$

$$Z_2 = \frac{1}{Y_2} = \frac{1}{2.09 < 45.2°\ mS} = 478 < -45.2°\ [Ohm]$$

$$Z_2 = Z_2 cos\theta - jZ_2 sen\theta$$
$$= (478[Ohm])\cos(-45.2°) - j(478[Ohm])sen(-45.2°)$$
$$= 337[Ohm] - j339[Ohm]$$

$$Z_{tot} = Z_1 + Z_2 = (1.0\ [kOhm] - j318\ [Ohm]) + (337\ [Ohm] - j339\ [Ohm])$$
$$= 1337\ [Ohm] - j657\ [Ohm]$$

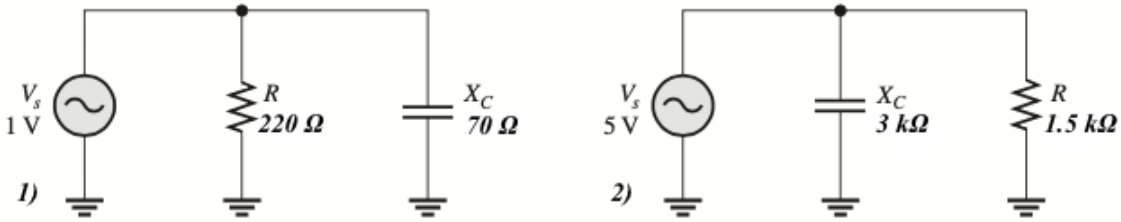
$$Z_{tot} = \sqrt{Z_1^2 + Z_2^2} < -\tan^{-1}\left(\frac{Z_2}{Z_1}\right) = \sqrt{(1338[Ohm])^2 + (657\ [Ohm])^2}$$
$$< -\tan^{-1}\left(\frac{657\ [Ohm]}{1337[Ohm]}\right) = 1.49 < -26.2°\ [kOhm]$$

2. Corriente total:

$$I_{tot} = \frac{V_s}{Z_{tot}} = \frac{10 < 0°\ V}{1.49 < -26.2°\ [kOhm]} = 6.71 < 26.2°\ mA$$

3. Angulo de fase en el cual I_{tot} adelanta al voltaje V, la respuesta es = 26,2°

- Determinar la magnitud y el ángulo de fase de la impedancia total en el circuito paralelo



Formula para calcular la magnitud e impedancia total:

$$Z = \left(\frac{RX_C}{\sqrt{R^2 + X_C^2}}\right) < -\tan^{-1}\left(\frac{R}{X_C}\right)$$

1) Determinamos la impedancia en el circuito 1 y la magnitud

$$Z = \left(\frac{(220\ [Ohm] * (70\ [Ohm])}{\sqrt{(220\ [Ohm])^2 + (70\ [Ohm])^2}}\right) < -\tan^{-1}\left(\frac{220\ [Ohm]}{70\ [Ohm]}\right)$$

$$Z = 66{,}7 < -72.34°\ [Ohm]$$
$$Z = 66.7\ [Ohm]\ y\ \theta = -72.34°$$

2) Determinamos la impedancia en el circuito 2 y la magnitud

$$Z = \left(\frac{(1.5\ [kOhm] * (3\ [kOhm])}{\sqrt{(1.5\ [kOhm])^2 + (3\ [kOhm])^2}}\right) < -\tan^{-1}\left(\frac{1.5\ [kOhm]}{3\ [kOhm]}\right)$$

$$Z = 1.34 < -26.56\ [Ohm]$$
$$Z = 1.34\ [Ohm]\ y\ \theta = -26.56°$$