Circuito 1

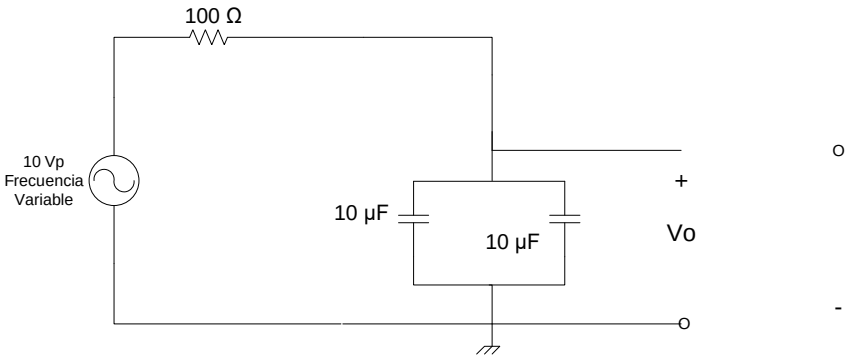

Figura 3: Esquema del circuito eléctrico con capacitores

Frecuencia 0 Hz

$$I=0$$

$$-Vp+0x100+V_o=0 \text{ (LTK)}$$

$$V_o=Vp=10<0° \text{ [} V \text{]}$$

Frecuencia 10 Hz

$w=2\pi f$ $w=2\pi(10)$

$w=20\ \pi$

$v(t)=10\cos(20\ \pi t)$

$$c\ 1=c\ 2=\frac{1}{jwc}=-j1591.54$$

$$Zeq = c1 \vee ¿ c2 = \frac{(-j1591.54)(-j1591.54)}{-j1591.54 - j1591.54} = -j795.77$$

$$Vo = \frac{-795.77}{100 - j795.77} * (10)$$

Vo=9.84+1.24 j [V] Vo=9.92<7.16°

$$I = \frac{\frac{10}{100 - j795.77} * 100 + j795.77}{100 + j795.77}$$

I=1.55exp−3+0.0123 j [A]

I=12.47<82.86° [mA]

Frecuencia 50 Hz

w=2πf w=2π(50)

w=100 π

$v(t)$=10cos(100πt)

c 1=c 2= $\frac{1}{}$ =−j318.330 jwc

$$Zeq = c1 \vee ¿ c2 = \frac{(-j318.30)(-j318.30)}{-j318.30 - j318.30} = -j159.15$$

$$Vo = \frac{-159.15}{100 - j159.15} * (10)$$

$Vo=7.16944-4.5048\ [V]$

$Vo=8.4672\leftarrow 32.14°$

$$I=\frac{\frac{10}{100-j\,159.15}*100+j\,159.15}{100+j\,159.15}$$

$I=0.0283+j0.045048\ [A]$

$I=53.2<57.86°\ [mA]$

Frecuencia 100 Hz

$w=2\pi f$ $w=2\pi(100)$

$w=200\ \pi$

$v(t)=10\cos(200\pi t)$

$c1=c2=\frac{1}{jwc}=-j159.1549$

$$Zeq=c1\vee ¿\,c2=\frac{(-j\,159.1549)(-j\,159.1549)}{-j\,159.1549-j\,159.1549}=-j\,79.57$$

$$Vo=\frac{-j\,79.57}{100-j\,79.57}*(10)$$

$Vo=3.88-j4.87$

$Vo=6.2266\leftarrow 51.455°\ [V]$

$$I=\frac{\frac{10}{100-j\,79.58}*100+j\,79.58}{100+j\,79.58}$$

I=0.06122+j0.04872 [A]

I=78.24<38.513 [mA]

Frecuencia 500 Hz

w=2πf w=2π(500)

w=1000 π

$v(t)$=10cos(1000πt)

$c1=c2=\frac{1}{jwc}=-j31.8330$

$Zeq=c1 \vee ¿ c2=\frac{(-j31.8330)(-j131.8330)}{-j31.8330-j31.8330}=-j15.915$

$Vo=\frac{-j15.915}{100-j15.915}*(10)$

Vo=0.2477− j1.55

Vo=1.57←80.96° [V]

$I=\frac{\frac{10}{100-j15.913}*100+j15.913}{100+j15.913}$

I=0.0975+ j0.01552 [A]

I=98.76<9.04° [mA]

Frecuencia 1000 Hz

$$Vp=10<0°=10+0\,j=10\ [\ V\ ]$$

$$Z=\frac{1}{x10^{-7}}=\frac{1}{j\omega C}=\frac{1}{jx1000}=-100\,j\ [\ \Omega]$$

$$Z_{eq1}=\frac{Z}{2}=-50\,j\ [\ \Omega]$$

$$V_o=V_{eq1}=\frac{Z_{eq1}}{Z_{eq1}+100}\,Vp=\frac{(-50\,j)}{100-50\,j}\,10=2-4\,j=4.47<-26.57°\ [V\ ]$$

$$Z_{eq2}=Z_{eq1}+100=100-50\,j\ [\ \Omega\ ]$$

$$I=\frac{Vp}{Z_{eq2}}=\frac{10}{100-50\,j}=0.08+0.04\,j\ [\ A]=0.09<26.57°\ [\ A\ ]$$

Circuito 2

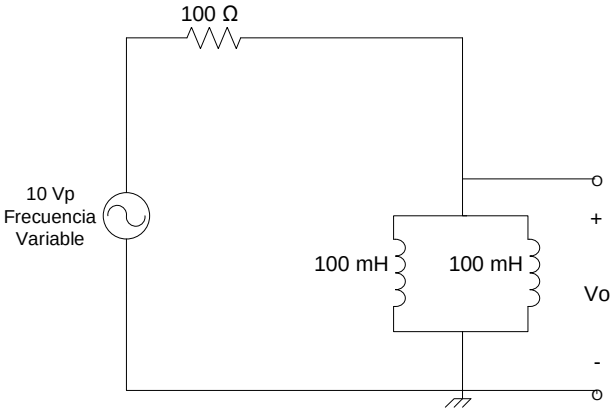

Figura 4: Esquema del circuito eléctrico con inductores

Frecuencia 0 Hz

$$V_o = 0$$

$$I = \frac{Vp}{R} = 0.1\ [A]$$

Frecuencia 10 Hz

$w = 2\pi f$ $w = 2\pi(10)$

$w = 20\ \pi$

$v(t) = 10\cos(\pi t)$

$L1 = L2 = jwL = j0.02\pi$

$$Zeq = L1 \vee ¿ L2 = \frac{(j0.02\pi)(j0.02\pi)}{j0.02\pi + j0.02\pi} = j2\pi$$

$$Vo = \frac{j2\pi}{100 + j2\pi} * (10)$$

$Vo = 0.0393 + j0.626$

$Vo = 0.627 < 86.4°\ [V]$

$$I = \frac{\frac{10}{100 + j2\pi} * 100 - j2\pi}{100 - j2\pi}$$

$I = 0.0996 - j0.00625\ [A]$

$I = 0.0998 \leftarrow 3.59°\ [mA]$

Frecuencia 50 Hz

$w=2\pi f$ $w=2\pi(50)$

$w=100\ \pi$

$v(t)=10\cos(100\pi t)$

$L1=L2=jwL=j10\pi$

$$Zeq=L1 \vee ¿ L2=\frac{(j10\pi)(j10\pi)}{j10\pi+j10\ \pi}=j5\pi$$

$$Vo=\frac{j5\pi}{100+j5\pi}*(10)$$

$Vo=0.2407+j1.5329$

$Vo=1.55168<81.07°$ [V]

$$=\frac{\frac{10}{100+j5\pi}*100-j5_{\pi j\ I}}{100-j5\pi}$$

$I=0.09759-j0.01533$ [A]

$I=98.78668\leftarrow 8.927°$ [mA]

Frecuencia 100 Hz

$w=2\pi f$ $w=2\pi(100)$

$w=200\ \pi$

$v(t)=10\cos(200\pi t)$

$L1=L2=jwL=j20\pi$

$Zeq=L1 \vee ¿ L2=\frac{(j20\pi)(j20\pi)}{j20\pi+j20\pi}=j10\pi$

$Vo=\frac{j10\pi}{100+j10\pi}*(10)$

$Vo=0.898+j2.86$

$Vo=2.99<72.56°$ [V]

$I=\frac{\frac{10}{100+j10\pi}*100-j10\pi j}{100-j10\pi}$ $I=0.0910-0.02859$ [A]

$I=95.38\leftarrow 17.4299°$ [mA]

Frecuencia 500 Hz

$w=2\pi f$ $w=2\pi(500)$

$w=1000\ \pi$

$v(t)=10\cos(1000\pi t)$

$L1=L2=jwL=j100\pi$

$Zeq=L1 \vee ¿ L2=\frac{(j100\pi)(j100\pi)}{j100\pi+j100\ \pi}=j50\pi$

$Vo=\frac{j50\pi}{100+j50\pi}*(10)$

$Vo=7.11+j4.53$

$Vo=8.4357<32.48°\ [V\ ]$

$$I=\frac{\frac{10}{100+j50\pi}*100-j50\pi j}{100-j50\pi}$$

$I=0.0288-j0.0453\ [\ A\ ]$

$I=53.7\leftarrow 57.52°\ [\ mA\ ]$

Frecuencia 1000 Hz

$$Vp=10<0°=10+0\,j=10\ [\ V\ ]$$
$$Z=j\omega L=jx1000\ x0{,}1=100\,j\ [\ \Omega]$$

$$\underline{Z}$$
$$Z_{eq1}=\ 2\ =50\,j\ [\Omega\ ]$$

$$\frac{Z^{eq1}}{}\qquad\frac{50\,j}{}$$
$$V_o=V_{eq1}=Z_{eq1}+100\ Vp=100+50\,j\ 10=2+4\,j=4.47<26.57°\ [\ V\ ]$$

$$Z_{eq2}=\underline{Z}_{eq1}+100=100+50\,j\ [\ \Omega]$$

$$I=\frac{\underline{Vp}}{}=\frac{10}{}=0.08-0.04\,j[\ A]=0.09<-26.57°\ [\ A\ ]$$