```
clc, clear, close all
format short g

%carga

r = 220; %[ohms]

%fuente trifasica

mVf = 120; %[V] rms magnitud de la fuente trifasica
f = 60;
w = 2*pi*f;

aVAN = 0; % angulos de cada tension
aVBN = -120;
aVCN = 120;

VAN = mVf*(cosd(aVAN)+j*sind(aVAN))
```

```
VAN =
   120
```

```
VBN = mVf*(cosd(aVBN)+j*sind(aVBN))
```

```
VBN =
         -60 -     103.92i
```

```
VCN = mVf*(cosd(aVCN)+j*sind(aVCN))
```

```
VCN =
         -60 +     103.92i
```

calculamos la capacitancia necesaria para tener un angulo de impedancia de -70°

```
syms angulo f C R

ec1 = solve(tan(angulo)==(1/(2*pi*f*C))/R,C)
```

ec1 =

$$\frac{1}{2\,R\,f\,\pi\,\tan(\mathrm{angulo})}$$

```
r = 220; %[ohms]
f = 60;
c = 1/(2*r*f*pi*tand(-70))
```

```
c =
  -4.3885e-06
```

sabiendo la capacitancia, calculamos la reactancia y la impedancia:

```
xc = 1/(2*pi*f*c)*j
```

```
xc =
            0 -     604.45i
```

```
z1 = r + xc; %impedancia con angulo requerido de -70°
z1_polar = [abs(z1) angle(z1)*180/pi]
```

```
z1_polar = 1×2
       643.24          -70
```

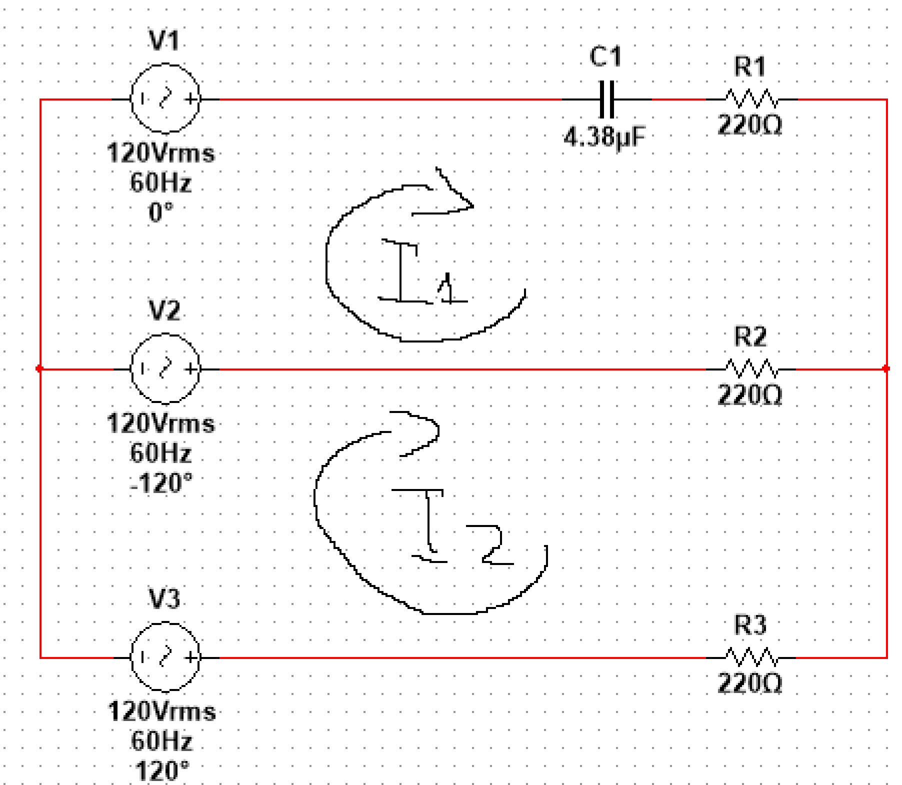
```
z2 = r
```

```
z2 =
   220
```

```
z3 = r
```

```
z3 =
   220
```

teniendo las impedancias, calculamos las corrientes de linea



realizamos un analisis de mallas

```
%tensiones de linea
VAB = VAN-VBN;
VAB_fasor = [abs(VAB) angle(VAB)*180/pi]
```

```
VAB_fasor = 1×2
       207.85           30
```

```
VBC = VBN-VCN;
```

```
VBC_fasor = [abs(VBC) angle(VBC)*180/pi]
```

```
VBC_fasor = 1×2
      207.85          -90
```

```
VAC = VAN-VCN;
VAC_fasor = [abs(VAC) angle(VAC)*180/pi]
```

```
VAC_fasor = 1×2
      207.85          -30
```

```
%analisis de malla para i1 e i2

syms i1 i2 r1 r2 r3 v1 v2 v3

ec1 = simplify(v2*(i1-i2) - v1*i1 + r1*i1 + r2*(i1-i2) == 0)
```

ec1 = $i_1\ (r_1 + r_2 + v_2) = i_2\, r_2 + i_1\, v_1 + i_2\, v_2$

```
ec2 = simplify(v3*i2 - v2*(i2-i1) + r2*(i2-i1) + r3*i2 == 0)
```

ec2 = $i_2\, r_3 + i_2\, v_3 + v_2\ (i_1 - i_2) = r_2\ (i_1 - i_2)$

```
m = [(z1+z2) -(z2); -(z2) (z3+z2)];
n = [VAB;VBC];
h = m\n;

i1 = h(1);
i1_fasor = [abs(i1) angle(i1)*180/pi]
```

```
i1_fasor = 1×2
     0.26138       61.367
```

```
i2 = h(2);
i2_fasor = [abs(i2) angle(i2)*180/pi]
```

```
i2_fasor = 1×2
     0.36311      -80.069
```

Sabemos que

```
IAa = i1;
IBb = i2-i1;
ICc = -i2;

IAa_fasor = [abs(IAa) angle(IAa)*180/pi]
```

```
IAa_fasor = 1×2
     0.26138       61.367
```

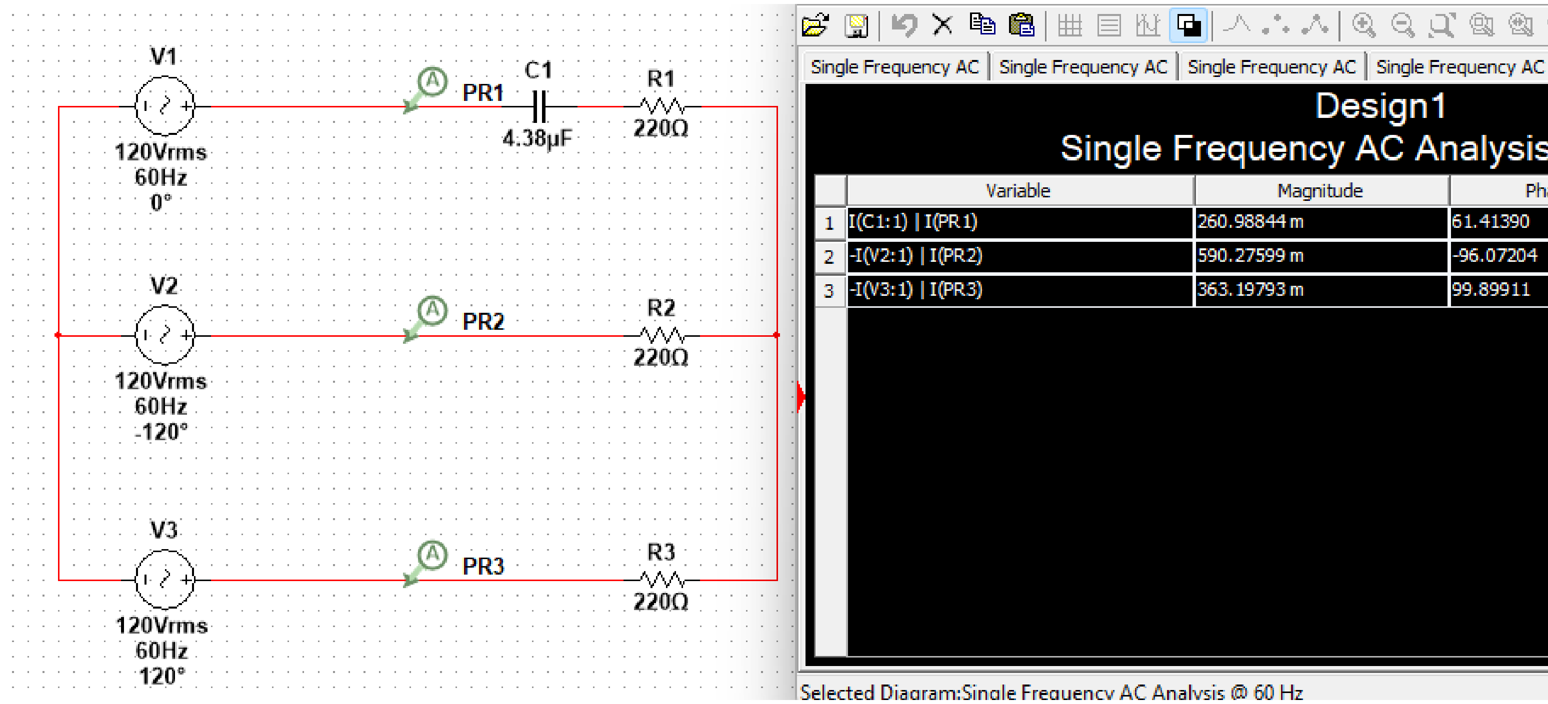
```
IBb_fasor = [abs(IBb) angle(IBb)*180/pi]
```

```
IBb_fasor = 1×2
     0.59041      -96.089
```

```
ICc_fasor = [abs(ICc) angle(ICc)*180/pi]
```

```
ICc_fasor = 1×2
     0.36311       99.931
```

Lo verificamos en el simulador:



Ahora que tenemos las corrientes podemos calcular la potencia compleja

```
S_r1 = (IAa*z1)*conj(IAa)
```

```
S_r1 =
       15.03 -      41.294i
```

```
S_r2 = (IBb*z2)*conj(IBb)
```

```
S_r2 =
       76.69
```

```
S_r3 = (ICc*z3)*conj(ICc)
```

```
S_r3 =
      29.007
```

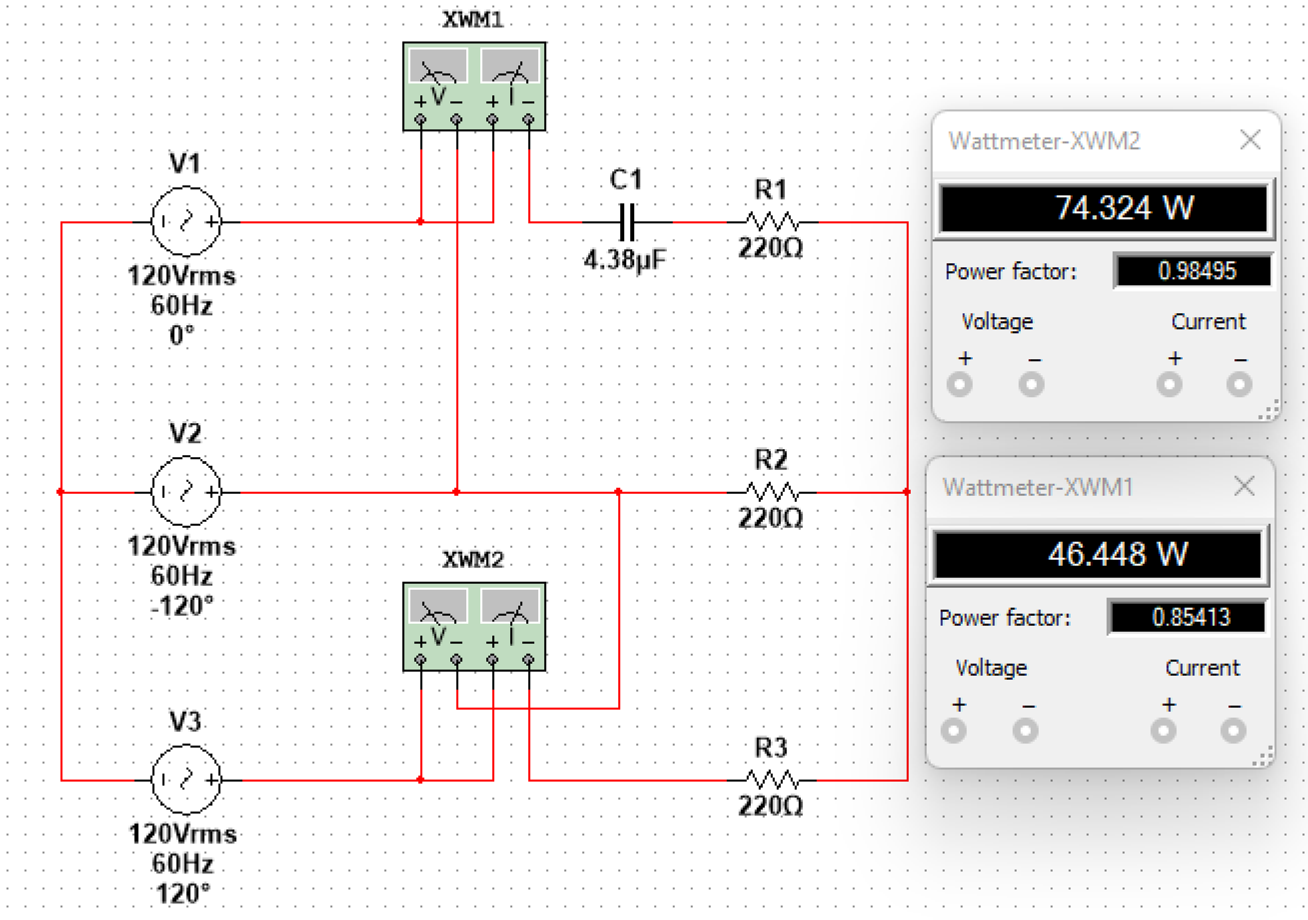
```
S_trifasica = S_r1 + S_r2 + S_r3
```

```
S_trifasica =
      120.73 -      41.294i
```

```
S_trifasica_polar = [abs(S_trifasica) angle(S_trifasica)*180/pi]
```

```
S_trifasica_polar = 1×2
      127.59      -18.883
```

comparamos con el metodo de los dos vatimetros



vemos que la suma de las dos lecturas de los vatimetros nos da igual al valor calculado de parte activa de la potencia compleja calculada anteriormente