12.21 (a) Find the real, reactive, and complex power delivered by the source in Figure P12.21. (b) What reactive element must be connected in parallel with the source to make its power factor 1?

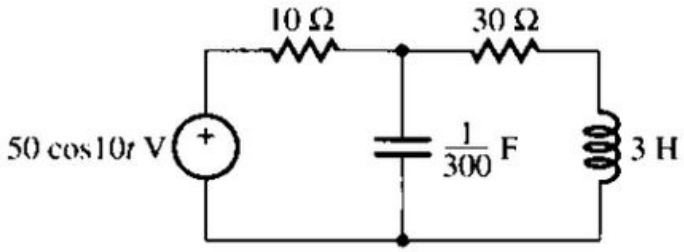


Figure P12.21

primero convertimos todo aimpedancias

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

vf = 50;
w = 10;
f = w/(2*pi);
c = 1/300;
l = 3;

z1 = 10;
z2 = (1/(j*w*c));
z3 = 30;
z4 = j*w*l;
```

reducimos impedancias

```
zeq = 1/((1/(z3+z4))+(1/z2)) + z1 % impedancia equivalente[omhs] carga capacitiva
```

```
zeq =
          40 -         30i
```

```
If = vf/zeq % corriente [A]
```

```
If =
         0.8 +        0.6i
```

```
S = vf*conj(If)*0.5 % potencia compleja [VAR]
```

```
S =
          20 -         15i
```

Ahora calculamos el factor de potencia:

```
fp = cos(atan(imag(S)/real(S))) %en adelanto
```

```
fp =
          0.8
```

como el factor de potencia esta en adlanto sabemos que se conectará un elemento inductivo:

```
xp = ((real(zeq)^2)+(imag(zeq)^2))/(real(zeq)*tan(-acos(1))-imag(zeq))*j %
```

```
xp =
           0 +     83.333i
```

verificamos el nuevo factor de potencia:

```
lp = xp/(j*w) % inductancia en paralelo a la fuente
```

```
lp =
       8.3333
```

```
zeq1 = 1/((1/zeq)+(1/(xp)))
```

```
zeq1 =
         62.5
```

```
If = vf/zeq1
```

```
If =
          0.8
```

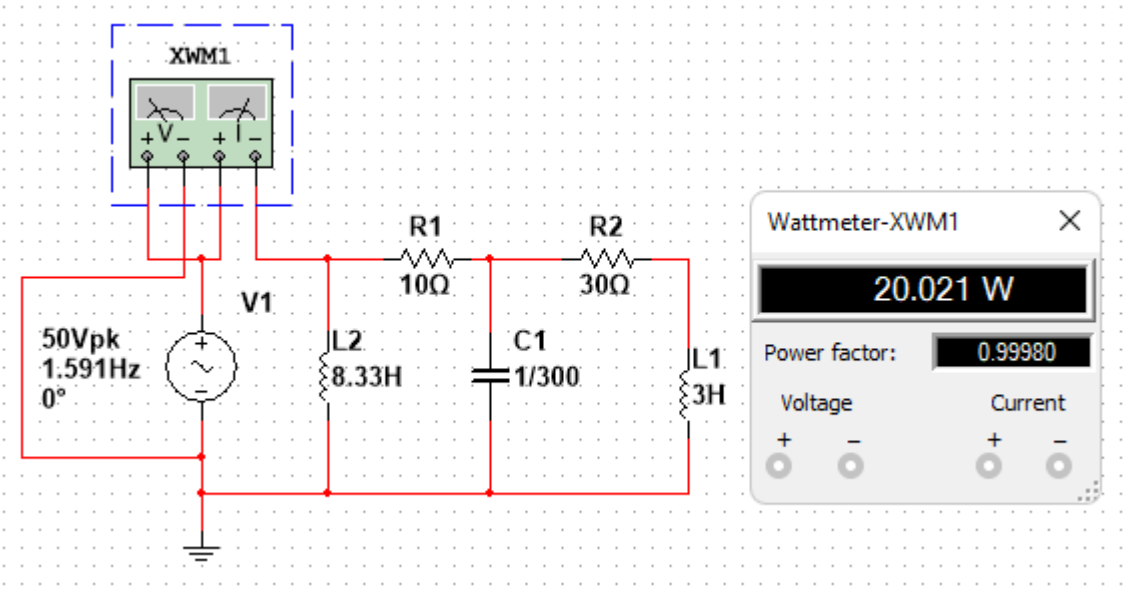
```
S = vf*conj(If)
```

```
S =
    40
```

```
fp = real(S)/abs(S)
```

```
fp =
     1
```

Vemos que se ha corregido el factor de potencia, lo verificamos en el simulador:


XWM1
+V−
+I−
R1
10Ω
R2
30Ω
V1
50Vpk
1.591Hz
0°
L2
8.33H
C1
1/300
L1
3H
Wattmeter-XWM1
20.021 W
Power factor:
0.99980
Voltage
Current
+
−
+
−