

12.20 In the arrangement of Figure P12.20 find P and Q , and state whether average power flow and reactive power flow is from System 1 to System 2 or vice versa if

- (a) $v = 120 \cos(\omega t + 60^\circ)$ V, $i = 2 \cos \omega t$ A
- (b) $v = 60 \cos(\omega t + 30^\circ)$ V, $i = 3 \cos(\omega t + 90^\circ)$ A
- (c) $v = 240 \cos \omega t$ V, $i = 15 \cos(\omega t + 150^\circ)$ A
- (d) $v = 10 \cos(\omega t + 60^\circ)$ V, $i = 1 \sin(\omega t + 60^\circ)$ A

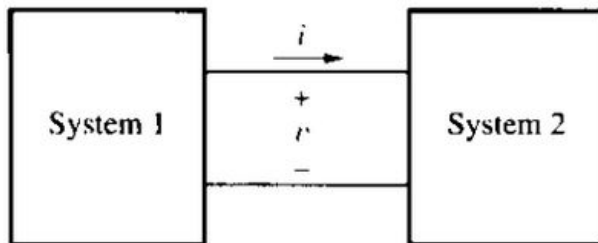


Figure P12.20

calculamos la potencia en cada caso :

a)

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

mv = 120;
av = 60;
I = 2;

v = mv*(cosd(av)+j*sind(av)) %convertimos el fador voltaje a su forma rectangular
```

```
v =
    60 +    103.92i
```

```
S = v*conj(I) %potencia compleja
```

```
S =
    120 +    207.85i
```

```
P = real(S) %[W]
```

```
P =
    120
```

```
Q = imag(S) %[VAR]
```

```
Q =
    207.85
```

b)

```
mv = 60;
```

```
av = 30;  
mI = 3;  
aI = 90;
```

```
v = mv*(cosd(av)+j*sind(av)) %convertimos el fasor voltaje a su forma rectangular
```

```
v =  
51.962 + 30i
```

```
I = mI*(cosd(aI)+j*sind(aI))
```

```
I =  
0 + 3i
```

```
S = v*conj(I) %potencia compleja
```

```
S =  
90 - 155.88i
```

```
P = real(S) %[W]
```

```
P =  
90
```

```
Q = imag(S) %[VAR]
```

```
Q =  
-155.88
```

c)

```
mv = 240;  
av = 0;  
mI = 1;  
aI = 60-90;
```

```
v = mv*(cosd(av)+j*sind(av)) %convertimos el fasor voltaje a su forma rectangular
```

```
v =  
240
```

```
I = mI*(cosd(aI)+j*sind(aI))
```

```
I =  
0.86603 - 0.5i
```

```
S = v*conj(I) %potencia compleja
```

```
S =  
207.85 + 120i
```

```
P = real(S) %[W]
```

```
P =  
207.85
```

```
Q = imag(S) %[VAR]
```

$$Q = 120$$

d)

```
mv = 10;
av = 60;
mI = 3;
aI = 90;

v = mv*(cosd(av)+j*sind(av)) %convertimos el fasor voltaje a su forma rectangular
```

$$v = 5 + 8.6603i$$

```
I = mI*(cosd(aI)+j*sind(aI))
```

$$I = 0 + 3i$$

```
S = v*conj(I) %potencia compleja
```

$$S = 25.981 - 15i$$

```
P = real(S) %[W]
```

$$P = 25.981$$

```
Q = imag(S) %[VAR]
```

$$Q = -15$$