Circuitos Electricos II

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Monitoria Circuitos II

GIT-HUB: https://github.com/brrsanchezfi/Circuitos_2022_1

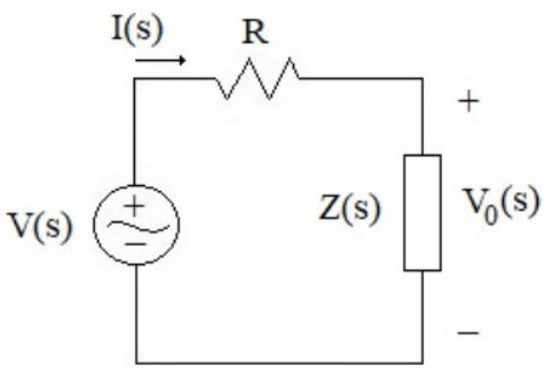
Soluciones propuestas para los ejercicios del taller 1

Table of Contents

PALABRAS CLAVES

reactancia, simulink, simscape, ltspice, matlab symbolic, numeros complejos, fasores.

Solucion Numerica



1. Calcule la potencia compleja $S = VI^* = |I|^2 Z$ para cada elemento del circuito.
2. Calcule la potencia de pérdidas.
3. Muestre el balance de potencia.

```
syms V I R Z V_0 s

%%%%___Valores propuestos___%%%%%
frecuencia = 60,
```

```
frecuencia = 60
```

```
V_s = pol_com(100,0);
R_n = 0.5;
Z_s = 2 + 10i;
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

I_s =  (V_s/(Z_s + R_n))
```

```
I_s = 2.3529 - 9.4118i
```

```
%%%%___POTENCIA COMPLEJA___%%%%

sys_potencia_i =  (((V*Z)/(R+Z))*conj(I))
```

```
sys_potencia_i =
```

$$\frac{V\,Z\,\overline{\mathrm{I}}}{R+Z}$$

```
sys_potencia_i = subs(sys_potencia_i,[V I R Z],[V_s I_s R_n Z_s])
```

```
sys_potencia_i =
```

$$\frac{3200}{17} + \frac{16000}{17}\,\mathrm{i}$$

```
sys_potencia_i = double(sys_potencia_i)
```

```
sys_potencia_i = 1.8824e+02 + 9.4118e+02i
```

```
%%%%___POTENCIAS DE PERDIDAS___%%%$

sys_perdidas = ((V*R)/(R+Z)*conj(I))
```

```
sys_perdidas =
```

$$\frac{R\,V\,\overline{\mathrm{I}}}{R+Z}$$

```
sys_perdidas = subs(sys_perdidas,[V I R Z],[V_s I_s R_n Z_s])
```

sys_perdidas =

$$\frac{800}{17}$$

```
sys_perdidas = double(sys_perdidas)
```

sys_perdidas = 47.0588

```
%%%%___BALANCE DE POTENCIA___%%%%

sys_balance = V*conj(I) - (sys_perdidas + sys_potencia_i)
```

sys_balance =

$$V\,\overline{\mathrm{I}} - \frac{4000}{17} - \frac{16000}{17}\,\mathrm{i}$$

```
sys_balance = subs(sys_balance,[V I R Z],[V_s I_s R_n Z_s])
```

sys_balance = 0

```
sys_balance = double(sys_balance)
```

sys_balance = 0

Simulacion

Fuente: $V = 100\angle 0V$
Resistencia línea: R = 0.5 Ω.

1. Dos casos: (a) Z(s) = 2 + j 10 Ω; (b) Z(s) = 2 - j 10 Ω
2. Calcule la potencia compleja $S = VI^* = |I|^2 Z$ para cada elemento del circuito.
3. Calcule la potencia de pérdidas.
4. Muestre el balance de potencia.

```
% Datos de simulacion
Frecuencia = 60; %Hz
V = pol_com(100,0);
R = 0.5;
Caso_1 = 2 + 10i; %Inductancia
    L = R_z(10,Frecuencia)
```

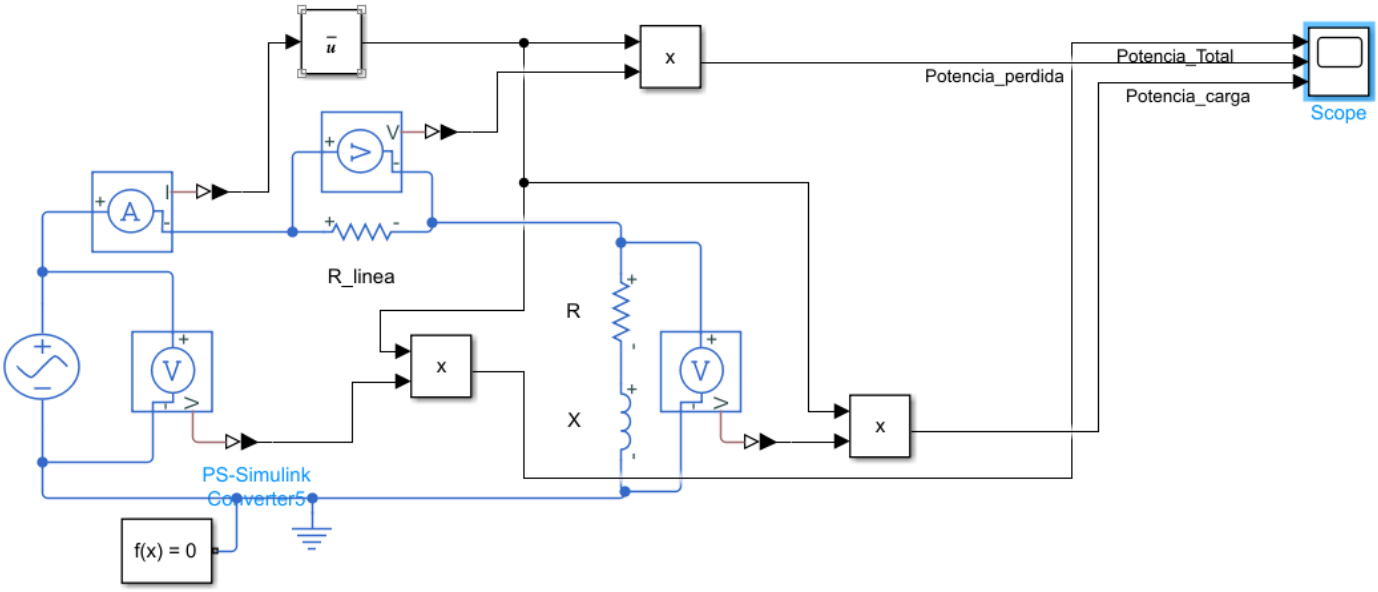
L = 0.0265

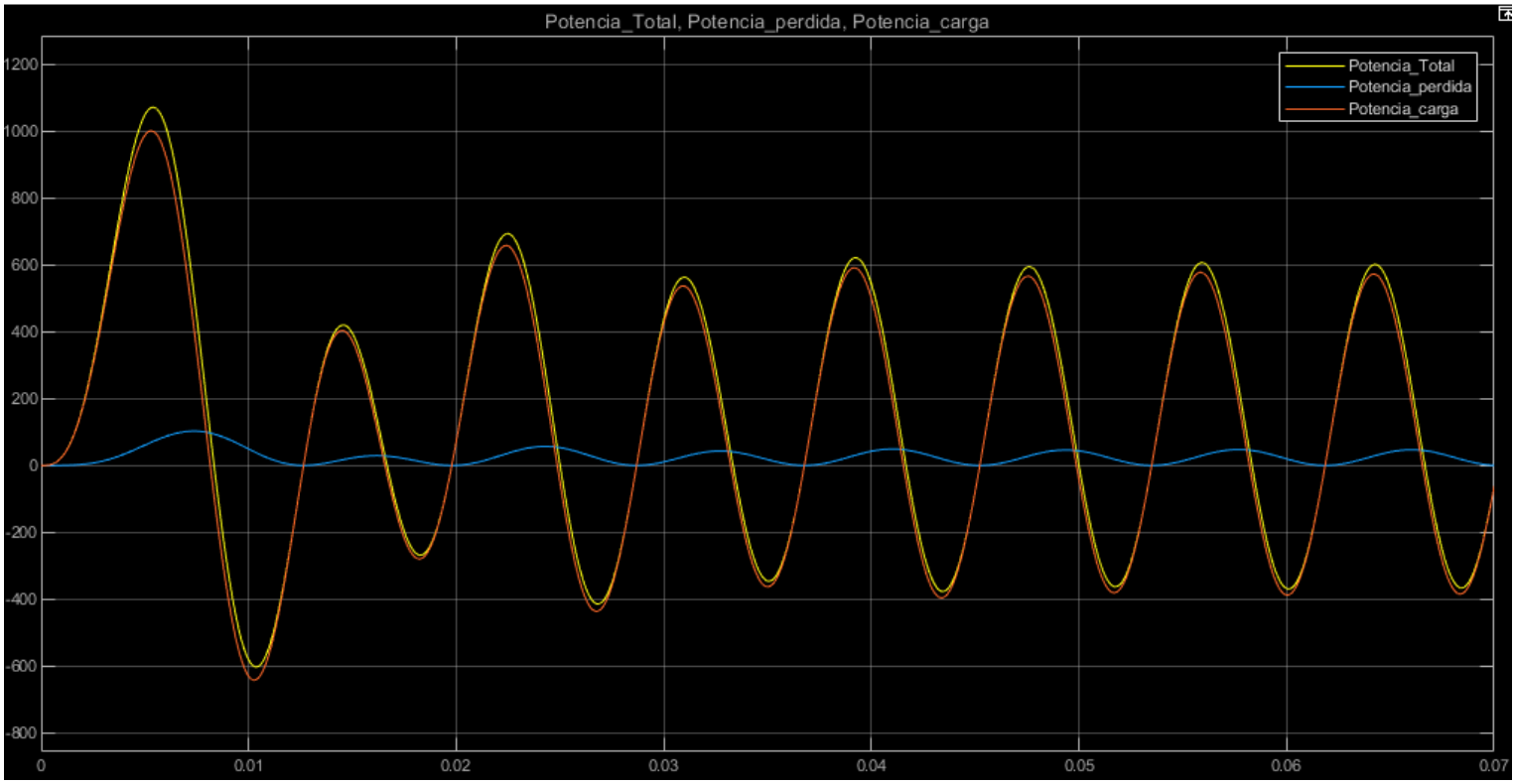
```
Caso_2 = 2 - 10i; %Capacitiva
    C = R_z(-10,Frecuencia)
```

```
C = 2.6526e-04
```

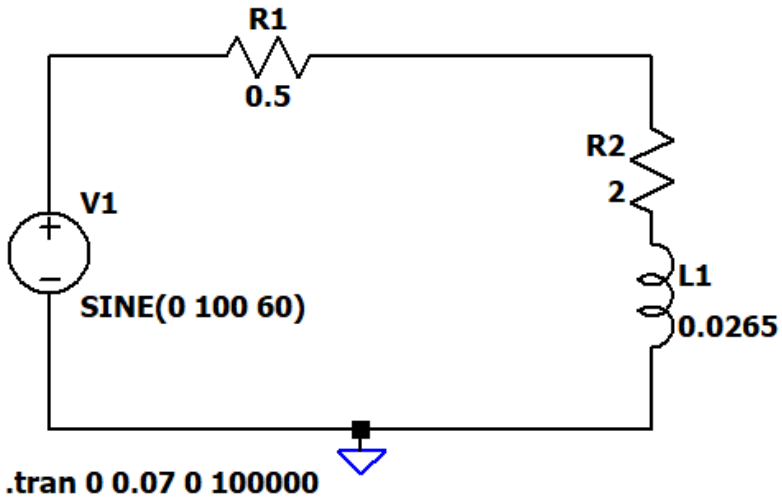
CASO 1

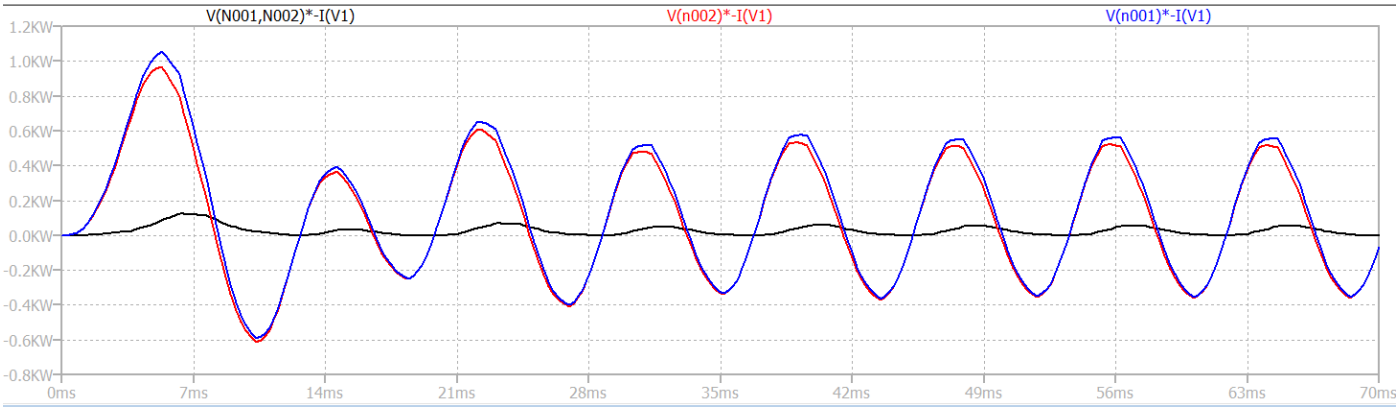
Simulink/Simscape





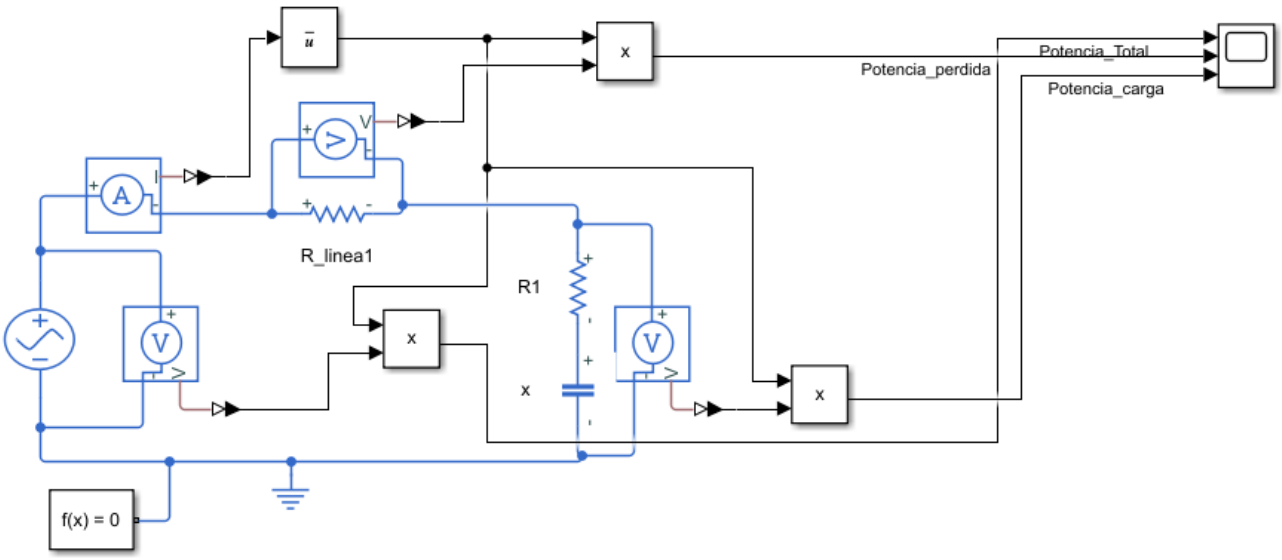
Ltspice

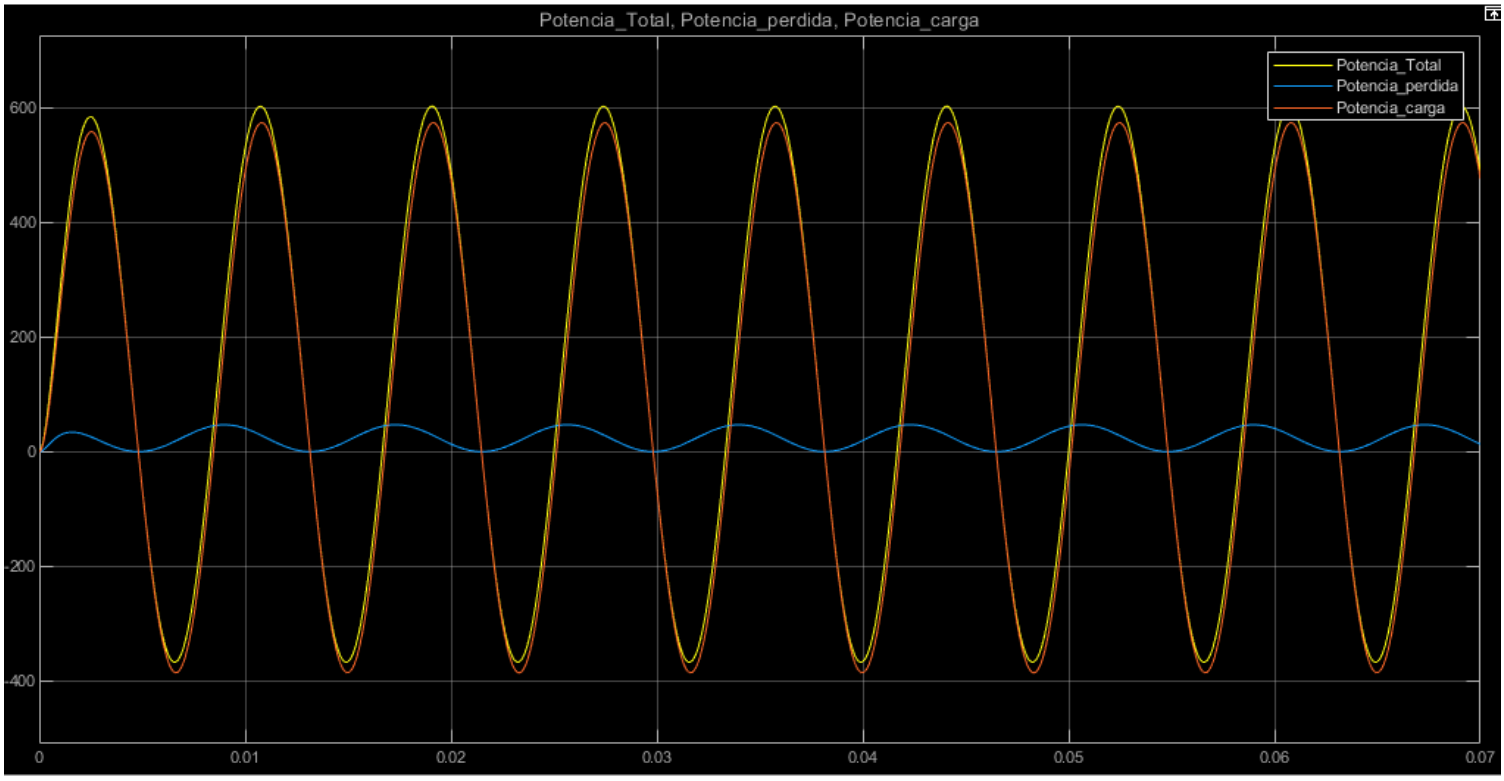




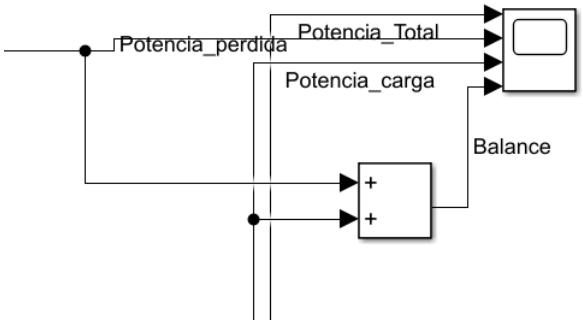
CASO 2

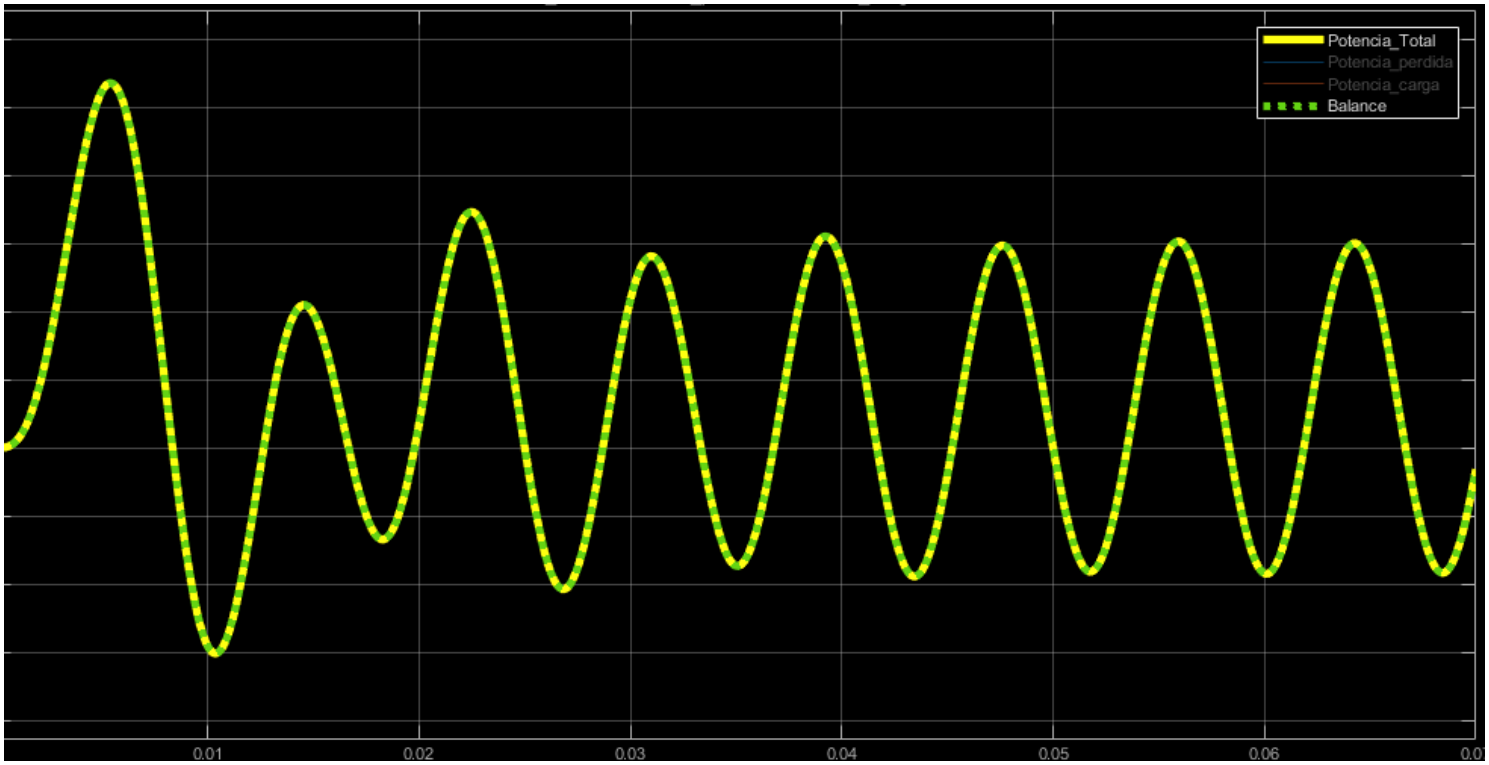
Simulink/Simscape




Potencia_Total, Potencia_perdida, Potencia_carga
Potencia_Total
Potencia_perdida
Potencia_carga
600
400
200
0
-200
-400
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07

Balance


Potencia_perdida
Potencia_Total
Potencia_carga
Balance
+
+




```
function Complejo = pol_com(M,A)  % magnitud, angulo

    Complejo = M * exp (deg2rad (A) * 1i);

end


function Z_z = R_z(X,f) %reactancia, frecuencia hz

    if X > 0

        L = (X)/(2*pi*f);
        Z_z = L;

    elseif X < 0

        C = (1)/(2*pi*f*abs(X));
        Z_z = C;

    else z == 0

        Z_z = z;

    end
end
```