

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

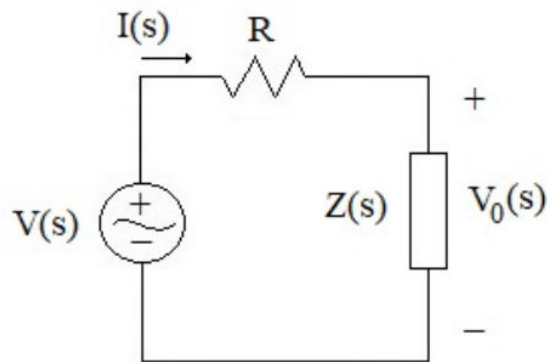
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PALABRAS CLAVES

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 =
```

$$\frac{V Z \bar{I}}{R + Z}$$

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

```
sys_potencia_i =
```

$$\frac{3200}{17} - \frac{16000}{17} i$$

```
sys_potencia_i = double(sys_potencia_i)*0.5
```

```
sys_potencia_i = 9.4118e+01 - 4.7059e+02i
```

```
%0.5 es la correccion a RMS 1/2
```

```
%%%__POTENCIAS DE PERDIDAS__%%$
```

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

```
sys_perdidas =
```

$$\frac{R V \bar{I}}{R + Z}$$

```
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)*0.5
```

```
sys_perdidas = 23.5294
```

```
%%%__BALANCE DE POTENCIA__%%%
```

```
sys_balance = V*conj(I)*0.5
```

```
sys_balance =
```

$$\frac{V \bar{I}}{2}$$

```
sys_balance = sys_balance - (sys_perdidas + sys_potencia_i)
```

```
sys_balance =
```

$$\frac{V \bar{I}}{2} - \frac{2000}{17} + \frac{8000}{17} i$$

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

```
sys_balance = ()
```

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

```
sys_balance = 0
```

Simulacion

Fuente: $V = 100 \angle 0^\circ V$

Resistencia línea: $R = 0.5 \Omega$.

- 1 Dos casos: (a) $Z(s) = 2 + j 10 \Omega$; (b) $Z(s) = 2 - j 10 \Omega$
- 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
```

$L = R_z(10, \text{Frecuencia})$

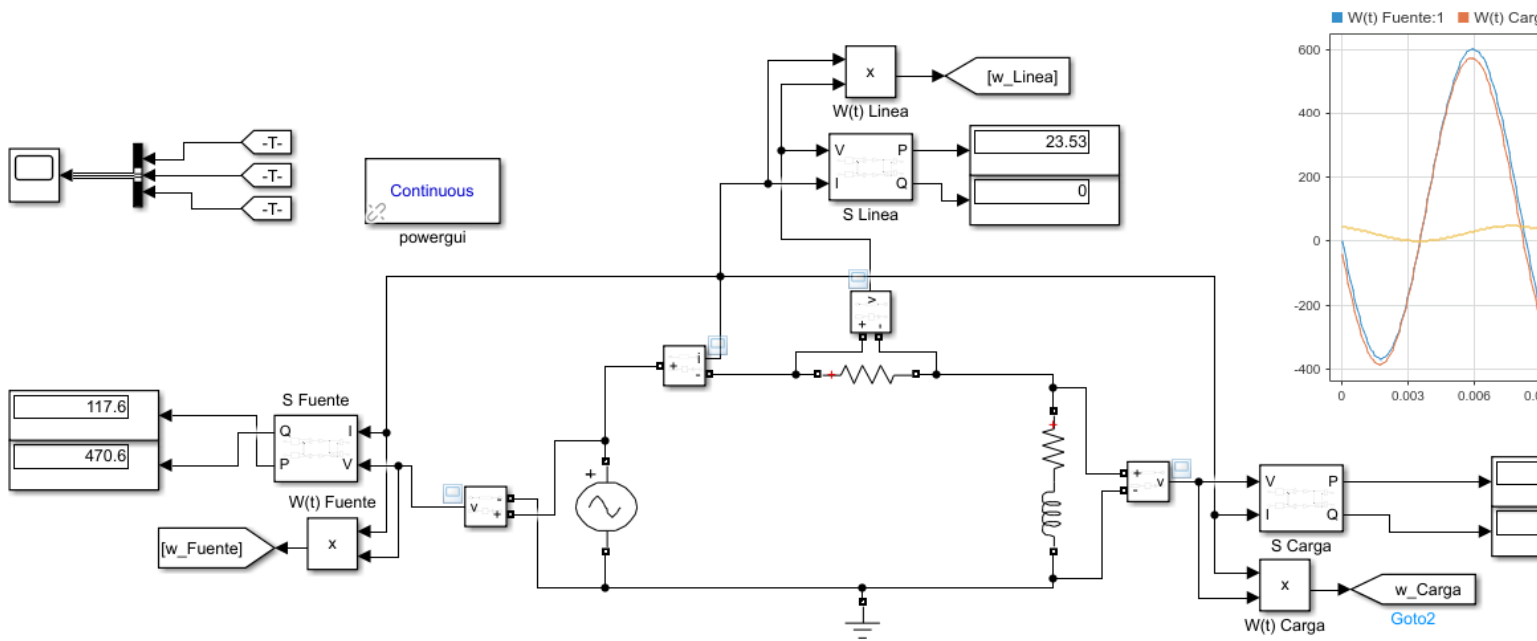
$L = 0.0265$

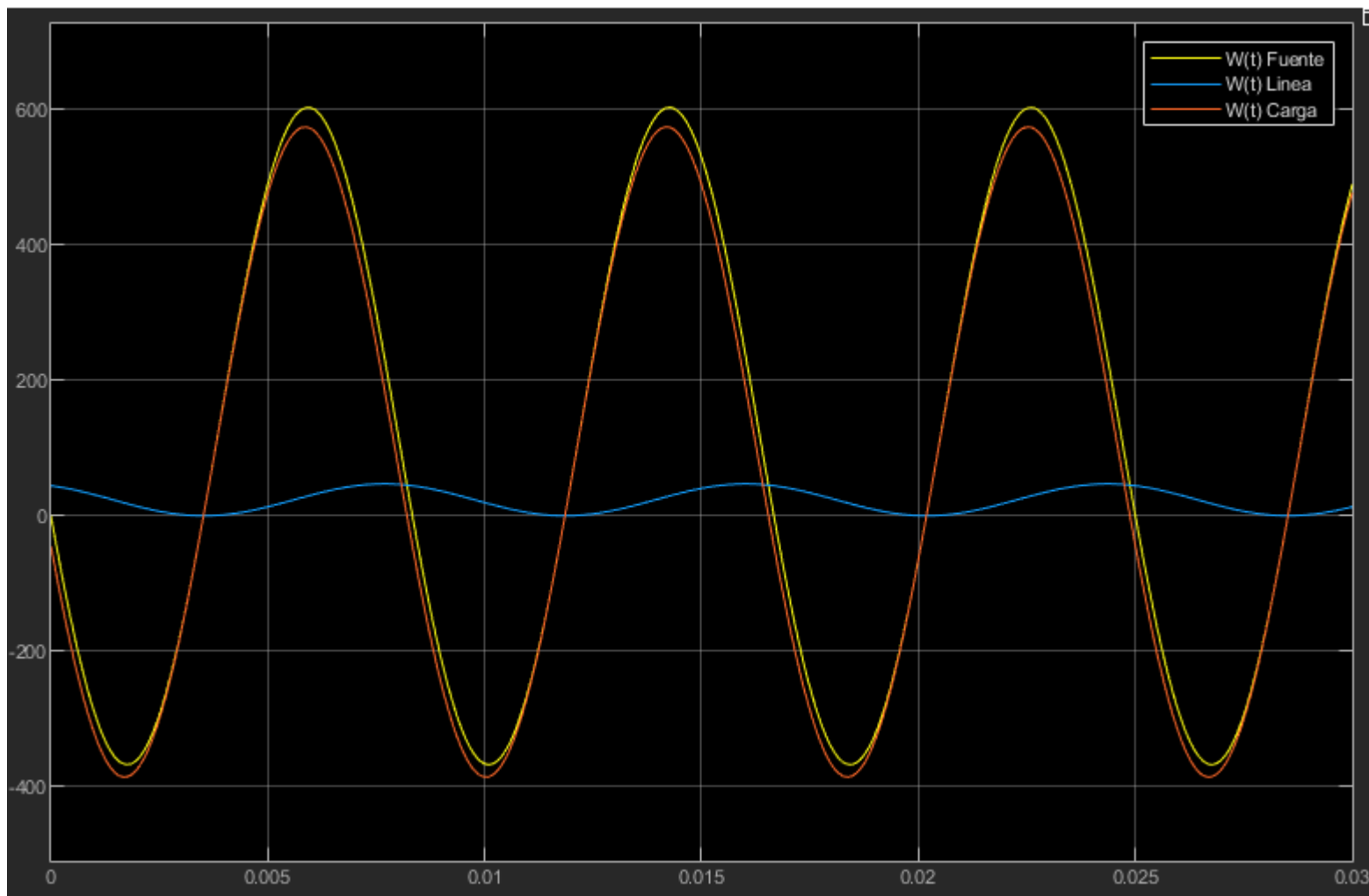
$\text{Caso}_2 = 2 - 10i; \% \text{Capacitiva}$
 $C = R_z(-10, \text{Frecuencia})$

$C = 2.6526e-04$

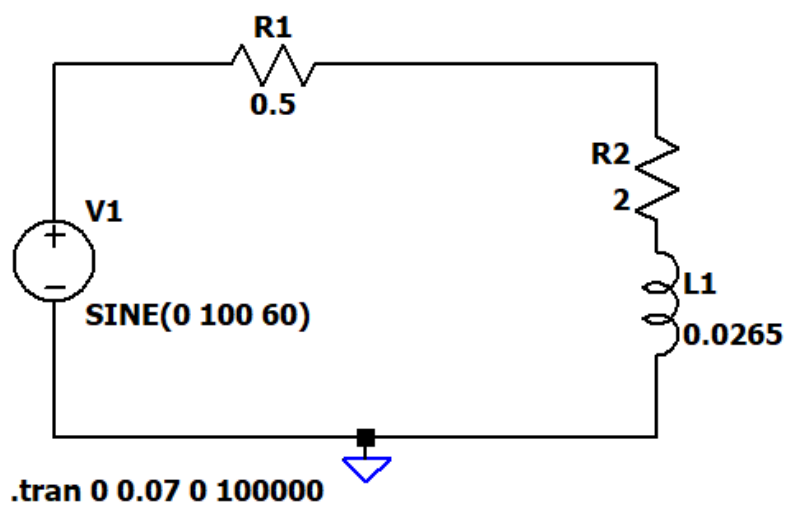
CASO 1

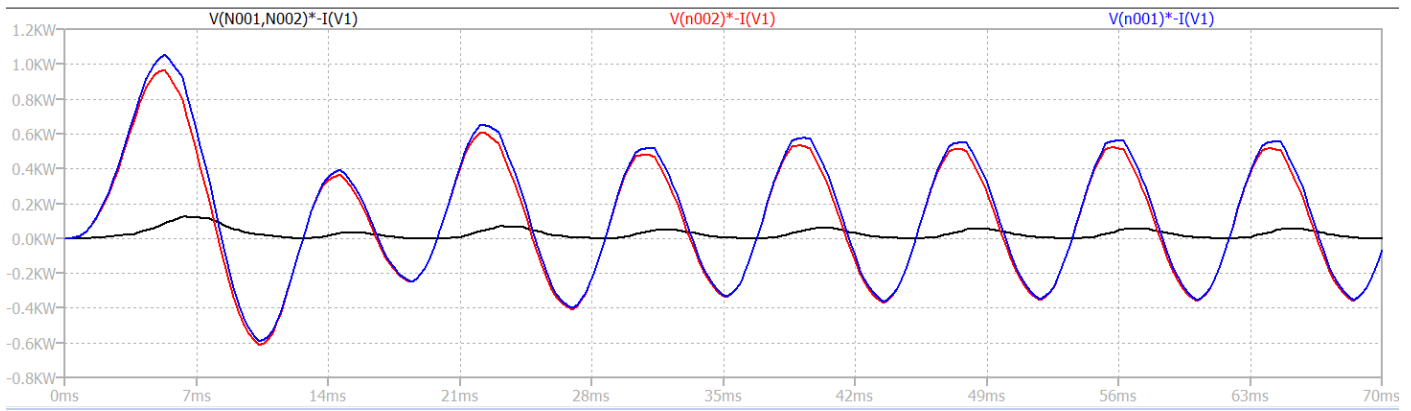
Simulink/Simscape





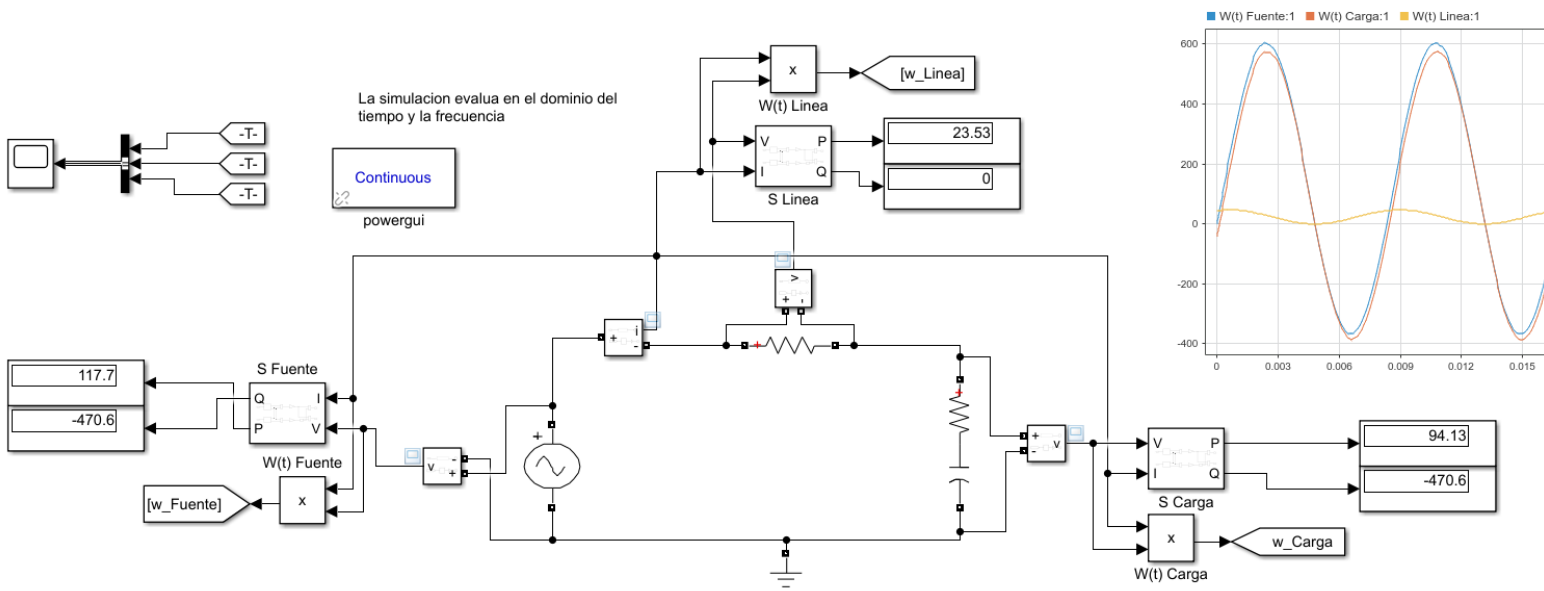
Ltspice

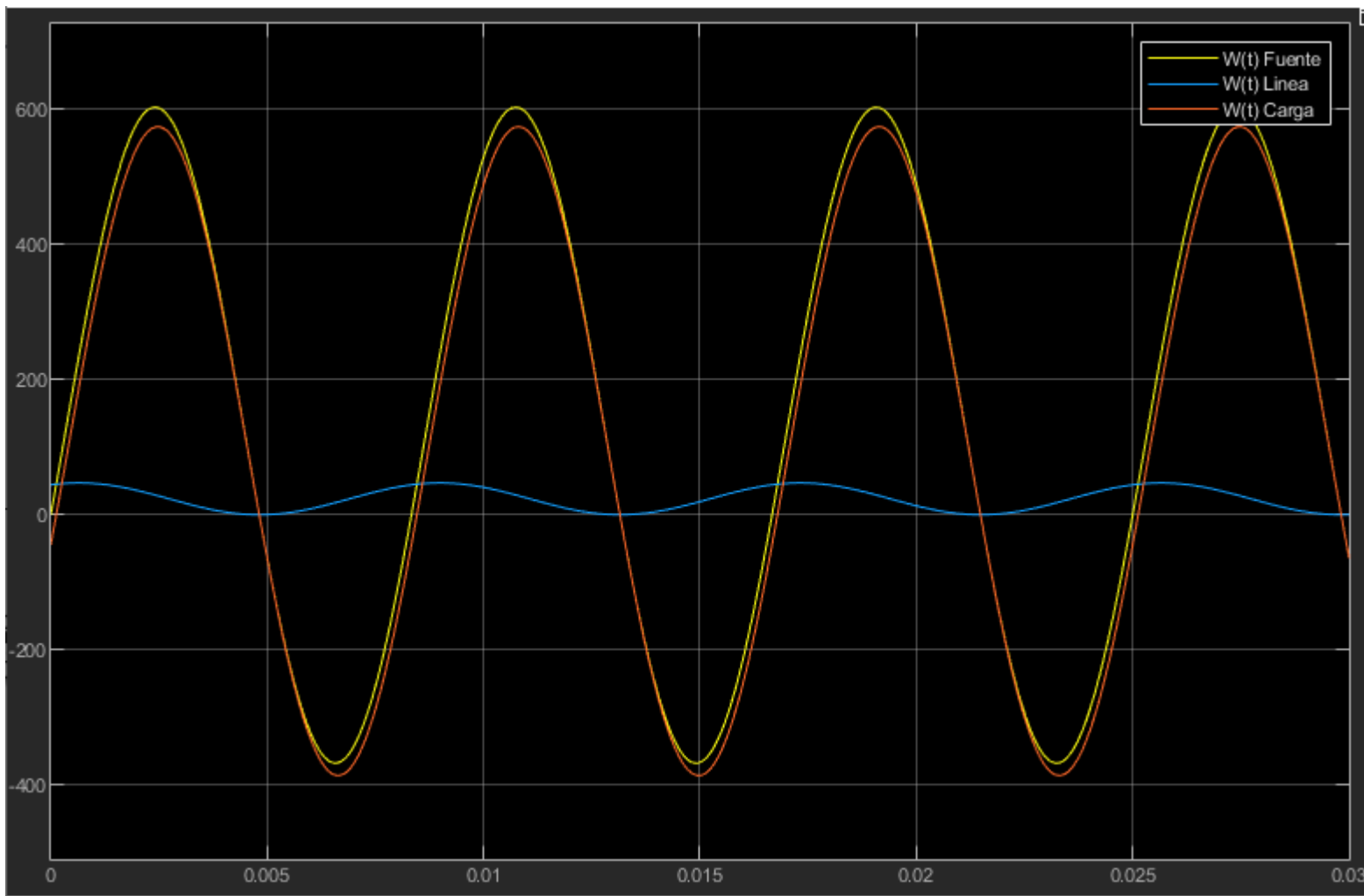




CASO 2

Simulink/Simscape





```
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
```