3° Tarea

Análisis de sistemas lineales

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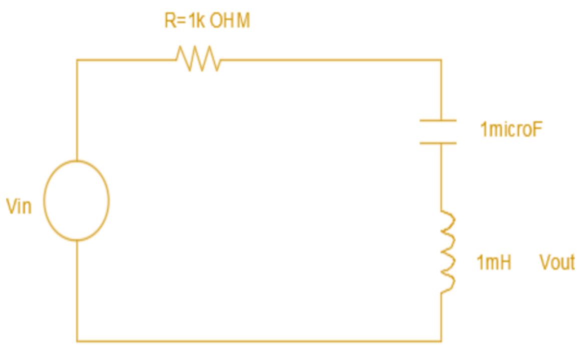
Dado el circuito RLC:



La función de transferencia es:

$$\frac{\mathrm{Vout(s)}}{Vin(s)} = \frac{Ls^2}{Ls^2 + Rs + \frac{1}{c}}$$

Los valores de los componentes utilizados son:

R=1KΩ
L=1mH
C=1µF

IMPULSO:

La siguiente ecuación es la del impulso sustituyendo con los valores

$$\frac{\mathrm{Vout(s)}}{Vin(s)} = \frac{(1mH)s^2}{1mHs^2 + 1\mathrm{K\Omega s} + \frac{1}{1\mathrm{\mu f}}}$$

Ó

$$\frac{\mathrm{Vout(s)}}{Vin(s)} = \frac{(0.001H)s^2}{0.001Hs^2 + 1000\Omega\mathrm{s} + \frac{1}{1 * 10^{-6}\mathrm{f}}}$$

Haciendo uso de fracciones parciales tenemos:

```
>> num=[0.001 0 0]

>> den=[0.001 1000 1000000]

>> pkg load control
>> [r,p,k]=residue(num,den)
```

```
r =

          1.00402
  -1000001.00402

p =

    -1001.00201
  -998998.99799

k =  1
```

Se tiene como salida:

$$\mathrm{Vout(s)} = \frac{1}{s+K} + \frac{-1}{s+M}$$

Con wólfram Alpha

ILT(1/(s+1000)

An attempt was made to fix mismatched parentheses, bra

Assuming "s" is a variable | Use as a unit instead

Input:

$$\mathcal{L}_s^{-1}\left[\frac{1}{s+1000}\right](t)$$

Result:

$$e^{-1000\,t}$$

Input interpretation:

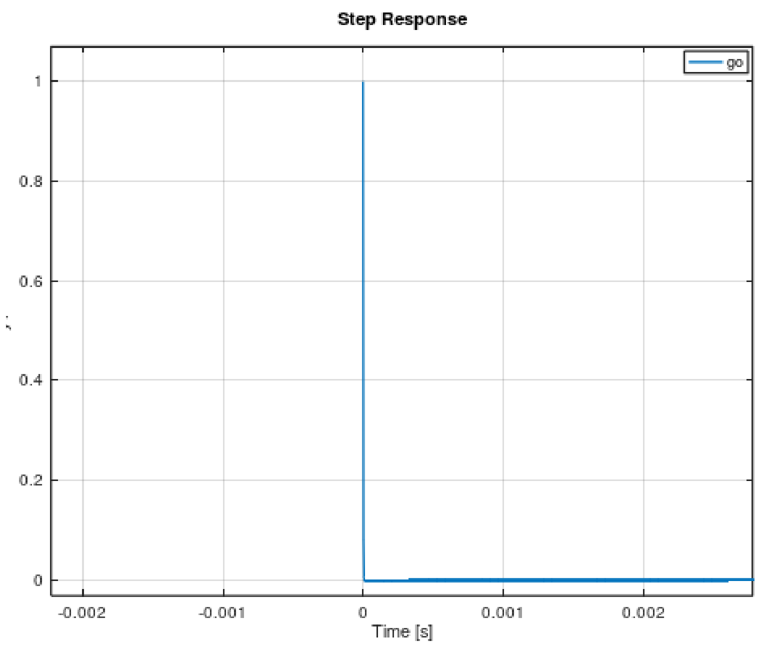
$$\mathcal{L}_s^{-1}\left[-\frac{1\times 10^6}{s+1\times 10^6}\right](t)$$

Result:

$$-1\,000\,000\,e^{-1\,000\,000\,t}$$

La ecuación del impulso es:

$e^{-1000t}-1000000e^{-1x10^{6}}t+1$



ESCALÓN:

$$\text{Vout(s)} = \frac{(1\text{mH})s^2}{1\text{mH}s^2 + 1\text{K}\Omega\text{s} + \frac{1}{1\mu\text{f}}} * \frac{1}{\text{s}}$$

Aplicando fracciones parciales con octave

```
>> pkg load control
>> num=[0.001 0]
num =

   0.0010000   0.0000000

>> den=[0.001 1000 1000000]
den =

         0.0010000      1000.0000000   1000000.0000

>> [r,p,k]=residue(num,den)
r =

  -0.0010030
   1.0010030

p =

    -1001.00201
  -998998.99799

k = [](0x0)
```

Siendo así la salida:

$$\mathrm{Vout(s)} = \frac{-1}{s+K} + \frac{1}{s+M}$$

Denuevo se hace uso de wólfram alpha para laplace

Input interpretation:

$$\mathcal{L}_s^{-1}\left[-\frac{1\times 10^{-3}}{s+1000}\right](t)$$

Result:

$$-\frac{e^{-1000\,t}}{1000}$$

Input:

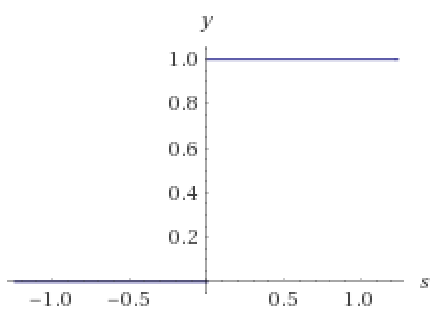
$$\mathcal{L}_s^{-1}\left[\frac{1}{s+1\,000\,000}\right](t)$$

Result:

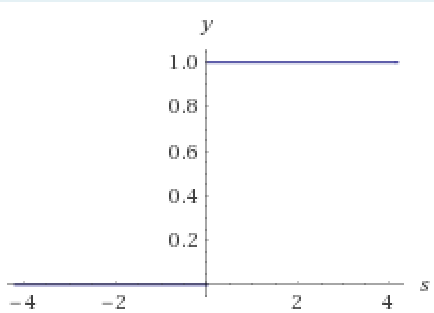
$$e^{-1\,000\,000\,t}$$

Graficando:

Plots:



(s from −1.2 to 1.2)



(s from −4.2 to 4.2)

RAMPA:

$$\mathrm{Vout(s)} = \frac{(1\mathrm{mH})s^2}{1\mathrm{mH}s^2 + 1\mathrm{K\Omega s} + \frac{1}{1\mu\mathrm{f}}} * \frac{1}{s^2}$$

Con fracciones parciales:

```
>> pkg load control
>> num=[0.001]
num =  0.0010000
>> den=[0.001 1000 1000000]
den =

         0.0010000      1000.0000000    1000000.0

>> [r,p,k]=residue(num,den)
r =

   0.0000010020
  -0.0000010020

p =

    -1001.00201
  -998998.99799

k = [](0x0)
```

$$\text{Vout(s)} = \frac{1 * 10^{-6}}{s + K} + \frac{1 * 10^{-6}}{s + M}$$

Resolviendo con wólfram Alpha Laplace inverso

Input interpretation:

$$\mathcal{L}_s^{-1}\left[\frac{1 \times 10^{-6}}{s + 1000}\right](t)$$

Result:

$$\frac{e^{-1000\,t}}{1\,000\,000}$$

Input interpretation:

$$\mathcal{L}_s^{-1}\left[-\frac{1\times 10^{-6}}{s+1\,000\,000}\right](t)$$

Result:

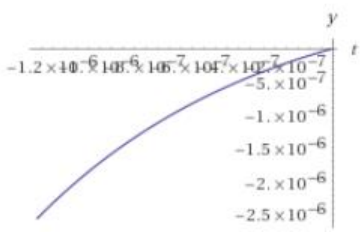
$$-\frac{e^{-1\,000\,000\,t}}{1\,000\,000}$$

Input:

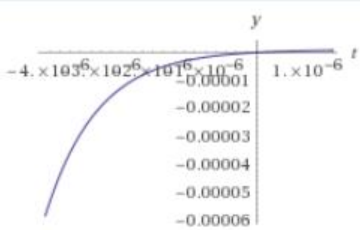
$$\frac{e^{-1000\,t}}{1\,000\,000}-\frac{e^{-1\,000\,000\,t}}{1\,000\,000}$$

Enlarge | Data | Customize | Plaintext | Interactive

Plots:



(t from -1.3×10^{-6} to 0)



(t from -4.1×10^{-6} to 1.5×10^{-6})