

Función de transferencia

PARTE 1

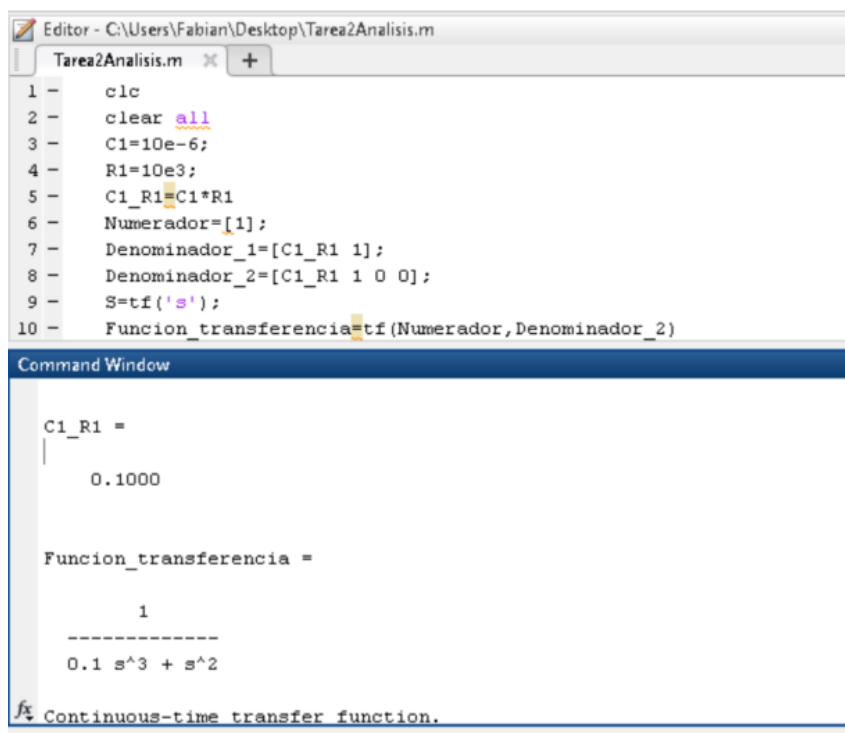
De la siguiente función de transferencia, utilizando Matlab vamos a comprobar su solución teniendo una V_{in} en función de una señal de rampa.

$$F(S) = \frac{1}{S * C_1 * R_1 + 1}$$

$$\lim_{s \rightarrow 0} S * F(S) * E(S) =$$

$$\lim_{s \rightarrow 0} S * \frac{1}{S * C_1 * R_1 + 1} * \frac{1}{s^2} =$$

$$\lim_{s \rightarrow 0} \frac{1}{S(S * C_1 * R_1 + 1)} = \infty$$



The image shows a MATLAB script editor window titled 'Tarea2Análisis.m' with the following code:

```
1 - clc
2 - clear all
3 - C1=10e-6;
4 - R1=10e3;
5 - C1_R1=C1*R1
6 - Numerador=[1];
7 - Denominador_1=[C1_R1 1];
8 - Denominador_2=[C1_R1 1 0 0];
9 - S=tf('s');
10 - Funcion_transferencia=tf(Numerador,Denominador_2)
```

Below the script, the Command Window displays the results of the execution:

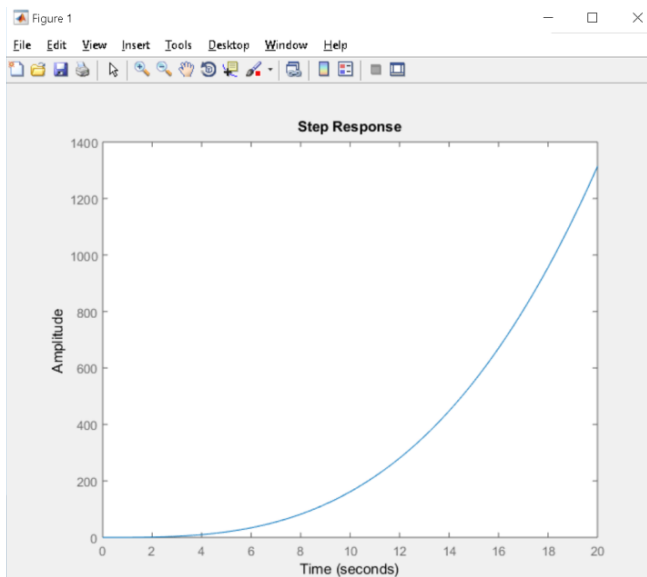
```
C1_R1 =
|
0.1000

Funcion_transferencia =

      1
-----
0.1 s^3 + s^2
```

At the bottom of the Command Window, it indicates: f_x Continuous-time transfer function.

Análisis de sistemas lineales
Martha Hernández Jara
Tarea #2



PARTE 2

- Valor de V_{out}

$$\frac{V_{out}}{V_{in}} = \frac{1}{S * C_1 * R_1 + 1}$$

$$V_{out} = \frac{1}{S * C_1 * R_1 + 1} * V_{in}$$

$$V_{out} = \frac{1}{S * C_1 * R_1 + 1} * \frac{1}{S^2}$$

$$V_{out} = \frac{1}{S^2(S * C_1 * R_1 + 1)}$$

Utilizando fracciones parciales y luego Matlab para obtener sus valores:

$$\frac{1}{S^2(S * C_1 * R_1 + 1)} = \frac{A * S + B}{S^2} + \frac{C}{S * C_1 * R_1 + 1}$$

Análisis de sistemas lineales Martha Hernández Jara Tarea #2

The screenshot shows a MATLAB Editor window with a script named 'Tarea2Analisis.m'. The script contains the following lines:

```

11 - Vin=1/s^2
12 - Vout=tf(Numerador,Denominador_2)
13 - step(Vout/S)
14 - [r,p,k]=residue(Numerador,Denominador_2)

```

Below the editor is the Command Window, which displays the results of the 'residue' function:

```

1
-----
0.1 s^3 + s^2

Continuous-time transfer function.

r =

    0.1000
   -0.1000
    1.0000

p =

   -10
     0
     0

```

Con los valores obtenidos y aplicando Laplace obtenemos lo siguiente:

$$\frac{1}{S^2(S * C_1 * R_1 + 1)} = \frac{A * S + B}{S^2} + \frac{C}{S * C_1 * R_1 + 1}$$

$$= \frac{-C_1 * R_1 * S + 1}{S^2} + \frac{C_1 * R_1}{S * C_1 * R_1 + 1}$$

$$= \frac{-C_1 * R_1 * S}{S^2} + \frac{1}{S^2} + \frac{C_1 * R_1}{S * C_1 * R_1 + 1}$$

$$= \frac{-C_1 * R_1}{S} + \frac{1}{S^2} + \frac{C_1 * R_1}{C_1 * R_1(S + \frac{1}{C_1 * R_1})}$$

$$= \frac{-C_1 * R_1}{S} + \frac{1}{S^2} + \frac{1}{S + \frac{1}{C_1 * R_1}}$$

$$V_t = t^{-C_1 * R_1} + t + e^{\frac{1}{C_1 * R_1} * t}$$