Respuesta en frecuencia

Ploteo respuesta en frecuencia

$$\frac{dy(t)}{dt} + ay(t) = x(t)$$

$$\sum_{k=0}^{N} a_k \frac{d^k y(t)}{dt^k} = \sum_{k=0}^{M} b_k \frac{d^k x(t)}{dt^k}$$

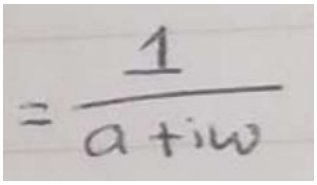
$$H(\omega) = \frac{Y(\omega)}{X(\omega)} = \frac{\sum_{k=0}^{M} b_k (j\omega)^k}{\sum_{k=0}^{N} a_k (j\omega)^k}$$

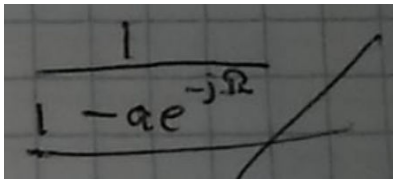
Obtener H(w)

$$y[n] - ay[n-1] = x[n]$$

$$\sum_{k=0}^{N} a_k y[n-k] = \sum_{k=0}^{M} b_k x[n-k]$$

$$H(\Omega) = \frac{Y(\Omega)}{X(\Omega)} = \frac{\sum_{k=0}^{M} b_k e^{-jk\Omega}}{\sum_{k=0}^{N} a_k e^{-jk\Omega}}$$





H(w)_Diferencial // H(w)_Diferencias

Uno es propiedad de Erik y otro es de Adrián.

Diferencial

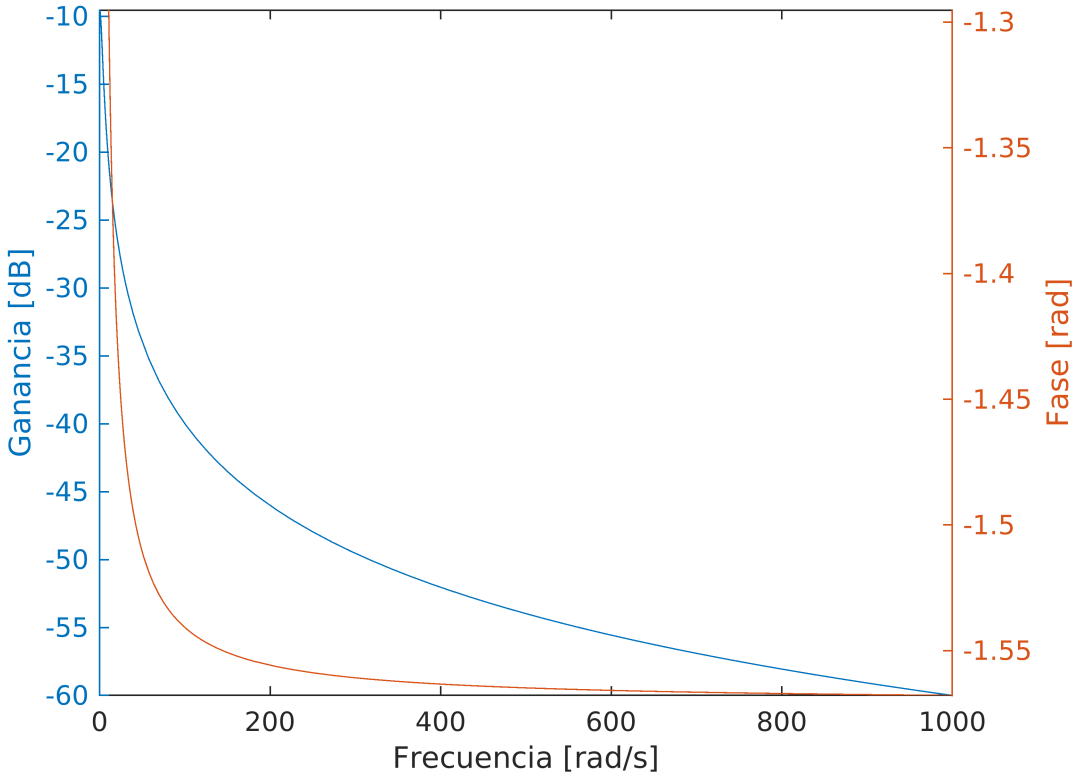
```
syms omega
a=3;
H=1/(a+1i*omega)
```

```
H =
```

$$\frac{1}{3 + \omega\,\mathrm{i}}$$

```
figure
%Magnitud db
yyaxis left
fplot(20*log10(abs(H)),[0 1000])
```

```
ylabel("Ganancia [dB]")

%Fase
yyaxis right
fplot(angle(H),[0.1 1000])
ylabel("Fase [rad]")

xlabel("Frecuencia [rad/s]")
```




```
%set(gca,'XScale','log')
```

Diferencias

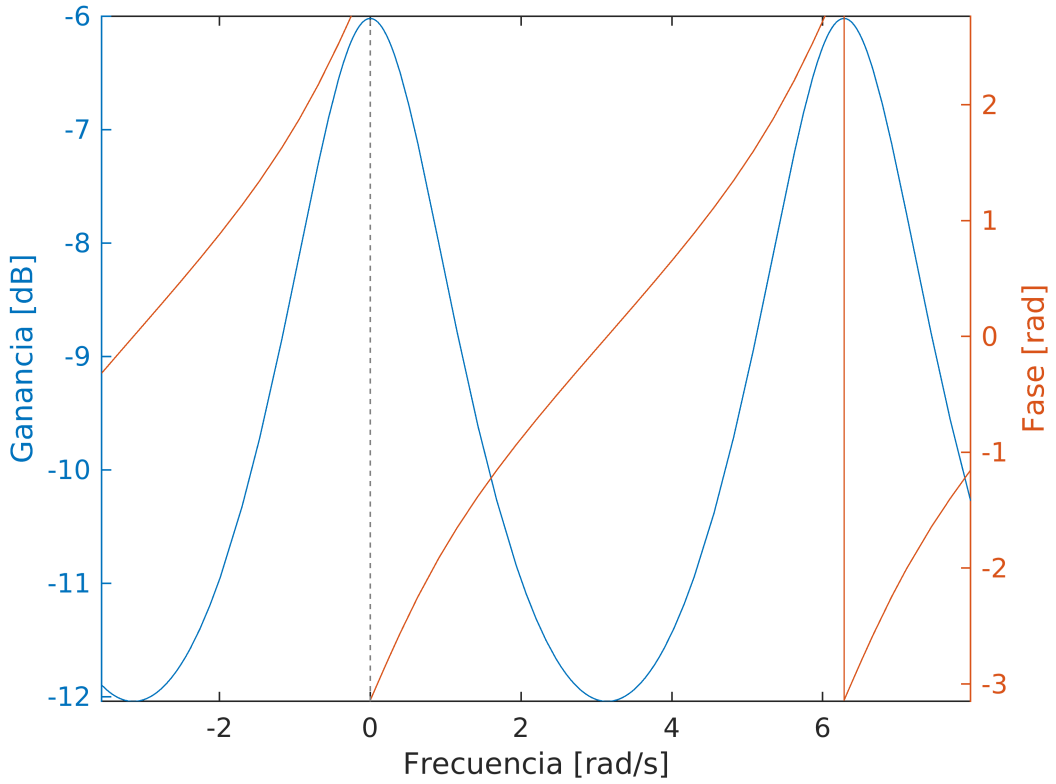
```
%Diferencial
syms omega
a=3;
H=1/(1-a*exp(-1i*omega))
```

```
H =
```

$$-\frac{1}{3\,e^{-\omega\,i}-1}$$

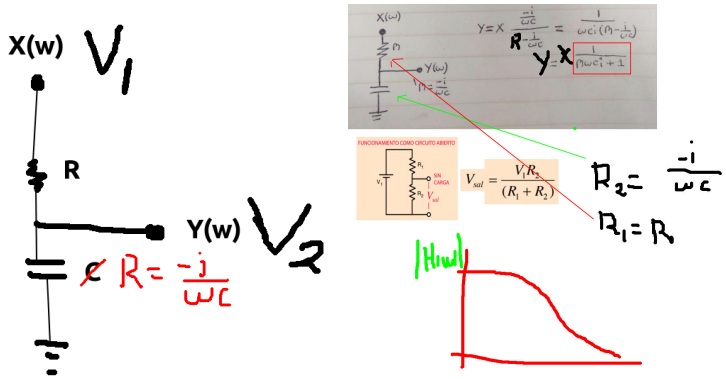
```
span=[-4*pi 4*pi];

figure
%Magnitud db
yyaxis left
```

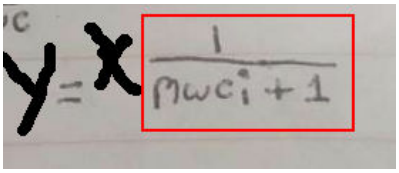
```
fplot(20*log10(abs(H)),span)
ylabel("Ganancia [dB]")

%Fase
yyaxis right
fplot(angle(H),span)
ylabel("Fase [rad]")

xlabel("Frecuencia [rad/s]")
```




```
%set(gca,'XScale','log')
```

Funcion transferencia filtro pasa bajos





Propiedad de Adrian

```
clear
syms f
C=220E-12%[F]
```

```
C = 2.2000e-10
```

```
R=10E3%[ohm]
```

```
R = 10000
```

```
%Respuesta en frecuencia
H=1/(R*C*(2*pi*f)*1i+1)
```

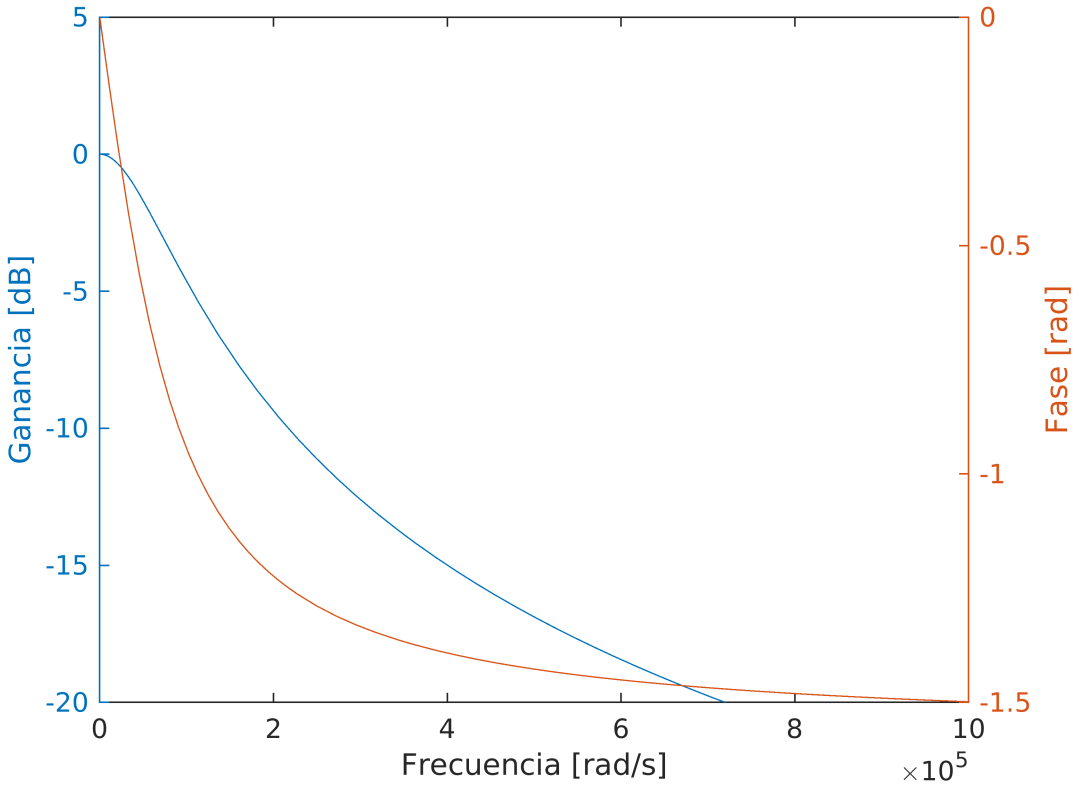
```
H =
```

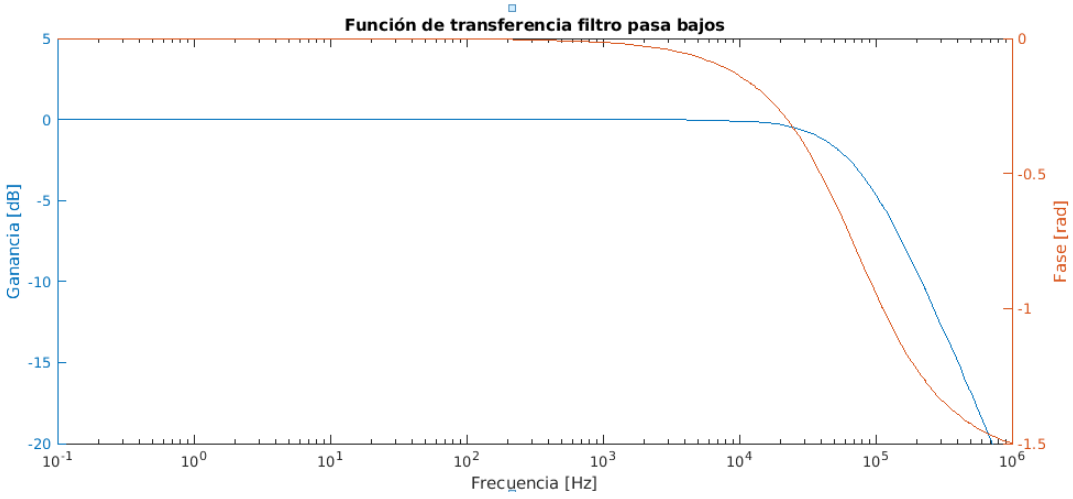
$$\frac{1}{1+\frac{5194603131156609\,\pi\,f\,\mathrm{i}}{11805916207174113034 24}}$$

```
span=[0.1 1E6]
```

```
span = 1×2
10^6 ×
    0.0000    1.0000
```

```
figure
%Magnitud db
yyaxis left
fplot(20*log10(abs(H)),span)
ylabel("Ganancia [dB]")
ylim([-20 5])

%Fase
yyaxis right
fplot(angle(H),span)
ylabel("Fase [rad]")
xlabel("Frecuencia [rad/s]")
```


Ganancia [dB]
Fase [rad]
Frecuencia [rad/s]
×10^5
5
0
-5
-10
-15
-20
0
2
4
6
8
10
-0.5
-1
-1.5


Función de transferencia filtro pasa bajos
Ganancia [dB]
Fase [rad]
Frecuencia [Hz]
5
0
-5
-10
-15
-20
-0.5
-1
-1.5
10^-1
10^0
10^1
10^2
10^3
10^4
10^5
10^6