```
clear all
close all
syms R C Ep t w
netlist={'V1 1 0 Ep'
    'R1 1 2 R'
    'R2 2 4 R'
    'C1 2 0 2*C'
    'C2 1 3 C'
    'C3 3 4 C'
    'R3 3 0 R/2'};
[X name]=fspice(netlist)
```

```
** fspice 2.43  ** (c) Frederic Martinez
X =
```

$$\begin{pmatrix} \mathrm{Ep} \\ \frac{\mathrm{Ep}\,(C\,R\,s+1)}{\sigma_1} \\ \frac{C\,\mathrm{Ep}\,R\,s\,(C\,R\,s+1)}{\sigma_1} \\ \frac{\mathrm{Ep}\,(C^2\,R^2\,s^2+1)}{\sigma_1} \\ -\frac{4\,\mathrm{Ep}\,(R\,C^2\,s^2+C\,s)}{\sigma_1} \end{pmatrix}$$

where

$$\sigma_1 = C^2\,R^2\,s^2 + 4\,C\,R\,s + 1$$

```
name = 1×5 cell
'V(1)'       'V(2)'       'V(3)'       'V(4)'       'I(V1)'
```

```
H=X(4)/X(1); %TL de la tension au noeud 4 sur TL de la tension au noeud 1
f=20; % en Hz, à faire varier 20, 170 puis 10000 Hz
e=cos(2*pi*f*t)*heaviside(t); %e(t)
E=laplace(e) %TL de e(t)
```

```
E =
```

$$\frac{s}{s^2 + 1600\,\pi^2}$$

```
S=E*H; % TL de s(t)
st=ilaplace(S) %TL inverse de S
```

```
st =
```

$$\frac{2560000\,\pi^4\,\sigma_2\,C^4\,R^4 - 256000\,\pi^3\,\sigma_4\,C^3\,R^3 - 3200\,\pi^2\,\sigma_2\,C^2\,R^2 + 160\,\pi\,\sigma_4\,C\,R + \sigma_2}{\sigma_1} + \frac{25600\,C^2\,R^2\,\pi^2\,\mathrm{e}^{-\frac{2\,t}{C\,R}}}{}$$

where

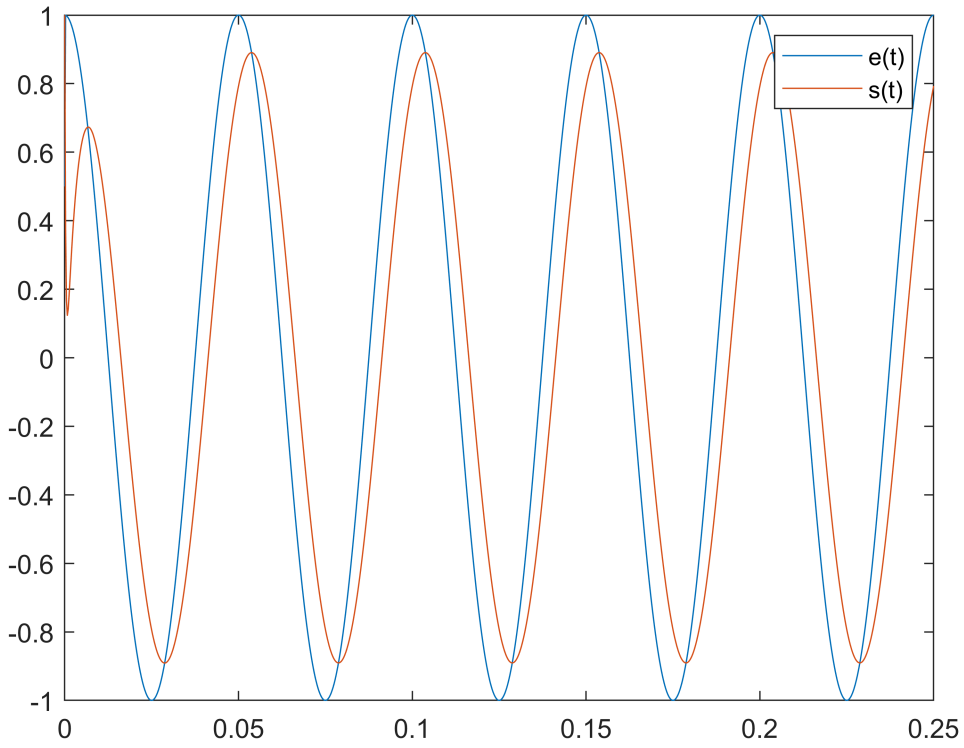
$$\sigma_1 = 2560000\,\pi^4\,C^4\,R^4 + 22400\,\pi^2\,C^2\,R^2 + 1$$

$$\sigma_2 = \cos(40\,\pi\,t)$$

$$\sigma_3 = \frac{\sqrt{3}\,t}{C\,R}$$

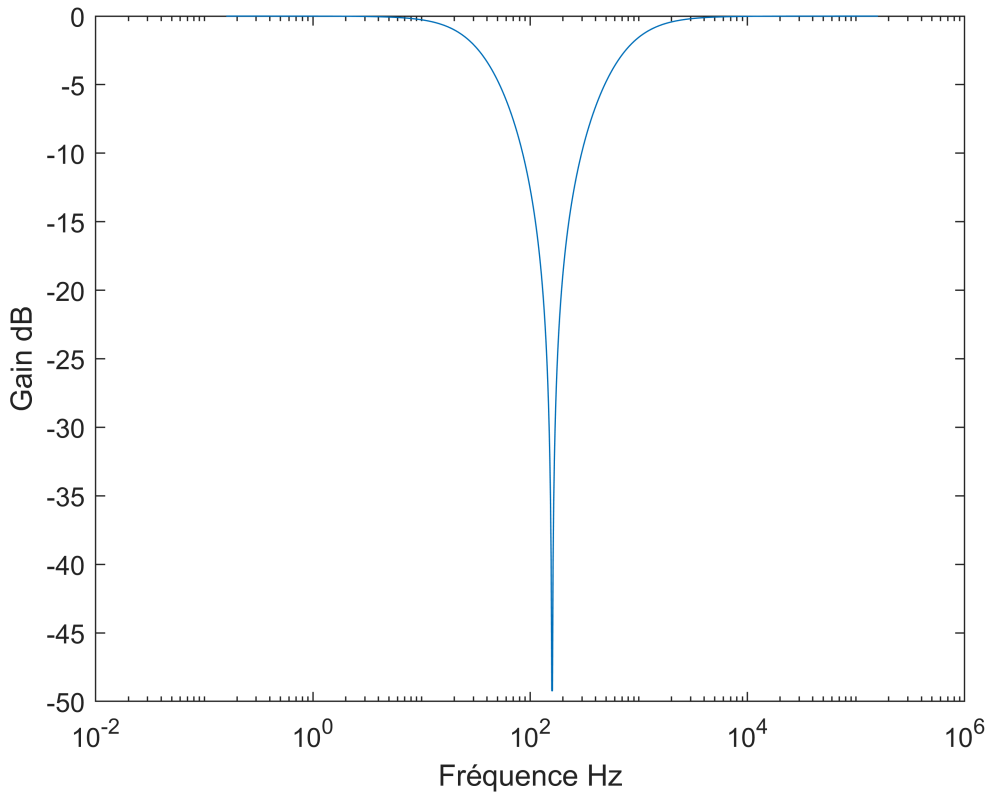
$$\sigma_4 = \sin(40\,\pi\,t)$$

```
t=linspace(0, 5/f,1000); R=1e3; C=1e-6;
enum=subs(e);
snum=subs(st);
plot(t,enum, t,snum)
legend('e(t)','s(t)')
```

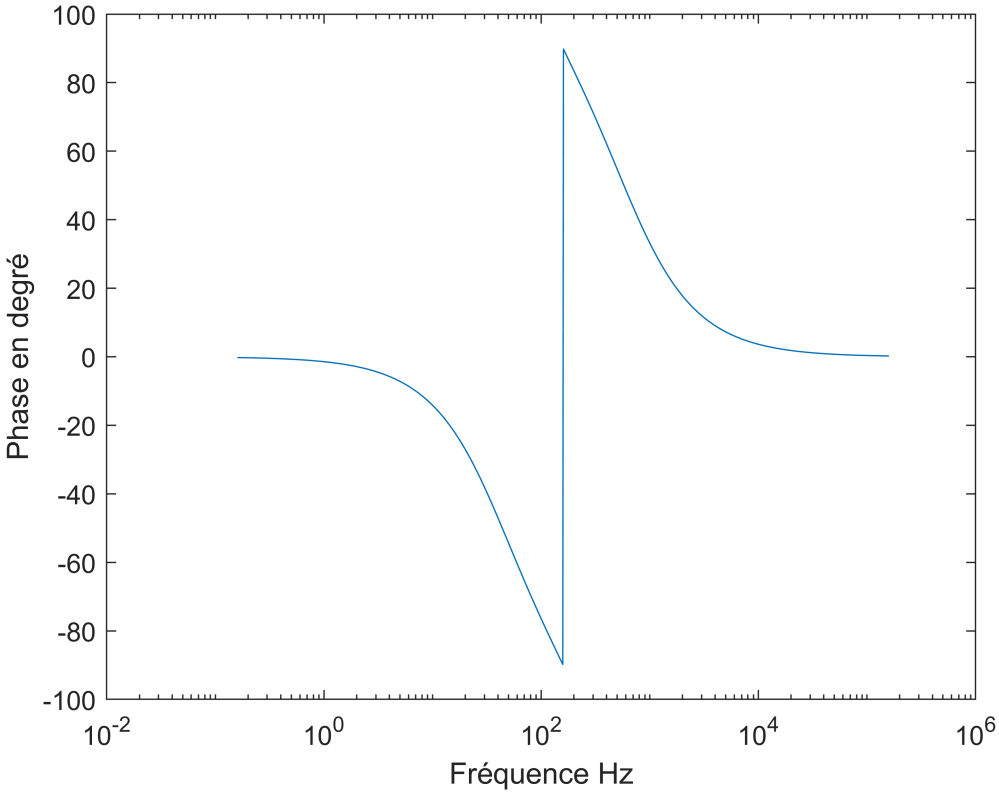



```
s=1j*w;
H=subs(H);
w=logspace(0,6,1000);
```

```
H=subs(H);
figure
semilogx(w/(2*pi),20*log10(abs(H)))
xlabel('Fréquence Hz')
ylabel('Gain dB')
```




```
figure
semilogx(w/(2*pi), angle(H)*180/pi)
xlabel('Fréquence Hz')
ylabel('Phase en degré')
```


100
80
60
40
20
0
-20
-40
-60
-80
-100
Phase en degré
10^{-2}
10^{0}
10^{2}
10^{4}
10^{6}
Fréquence Hz