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Compte-rendu de TP3 TSA :

Partie 1 :

Ex11 : Le code pour les exercices de 1.1 a 1.3 sans la correction

```
clear all; close all;

Fs   = 500;
B    = 160;
v0   = 100;
Dnu  = 16;
T    = 100;
ordre= 6;
sigma= sqrt(5);

%% Exercice 1.1:
figure(1);
Xp = struct('sigma',sigma,'Fs',Fs,'B',B,'T',T) ;
[X,Xp] = CGN(Xp);

moyX = mean(X.data);
varianceX = (std(X.data))^2;
sig0 = varianceX/(2*B);

rep11 = sprintf('Rep1.1:\n La moyenne = %d \n La variance = %d \n sig0 =
%d',moyX,varianceX,sig0);
disp(rep11);
%% Exercice 1.2:
figure(2);
Fp = struct('Fs',Fs,'F0',v0,'Dnu',Dnu,'order',ordre,'class','BP filter');
[Y,Fp ] = BPF(X,Fp);

moyY      = mean(Y.data);
varianceY = (std(Y.data))^2;
densite = varianceY/(2*Dnu);

rep11 = sprintf('Rep1.2:\n La moyenne = %d \n La variance = %d \n Densite =
%d',moyY,varianceY,densite);
disp(rep11);

 %% Exercice 1.3:
figure(3);
[Z] = SquareSig(Y);
prod = [2,20,100];

for i=1:length(prod)
   figure(3+i);
   RC = prod(i)/Dnu;
   RCFp = struct('Fs',Fs,'RC',RC);
   [W,RCFp] = RCF (Z,RCFp);

   moyW      = mean(W.data);
   varianceW = (std(W.data))^2;
   kurt      = kurtosis(W.data);
   rep13 = sprintf('Rep1.3: \n Dnu x RC = %d, \n RC = %d \n La moyenne = %d \n La variance
```

```
= %d \n Kurtosis = %d',prod(i),RC,moyW,varianceW,kurt);
  disp(rep13);
end
```

Figure 1 :

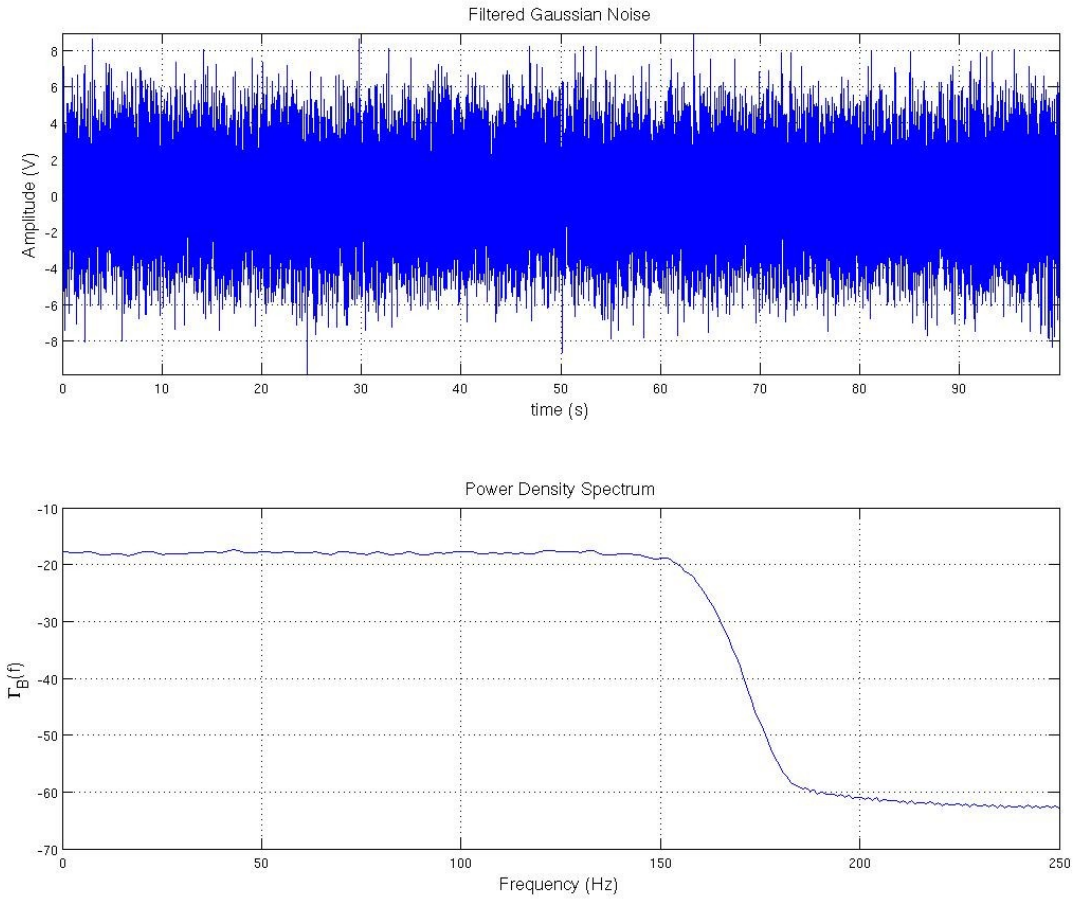
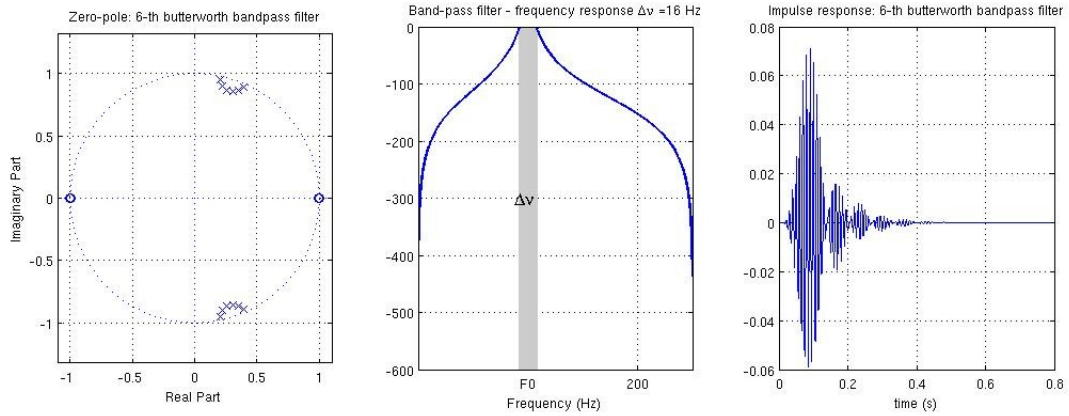
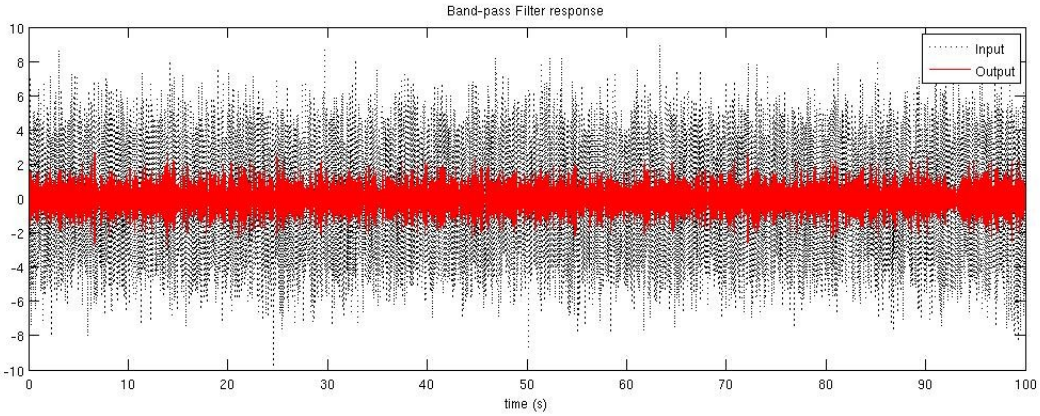


Figure 2 :



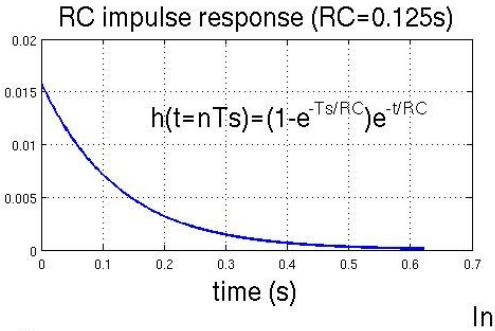


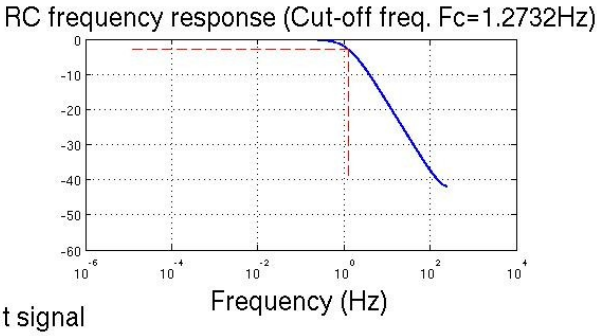
<u>Ex11 :</u> Le code pour les exercices de 1.1 a 1.3 avec la correction

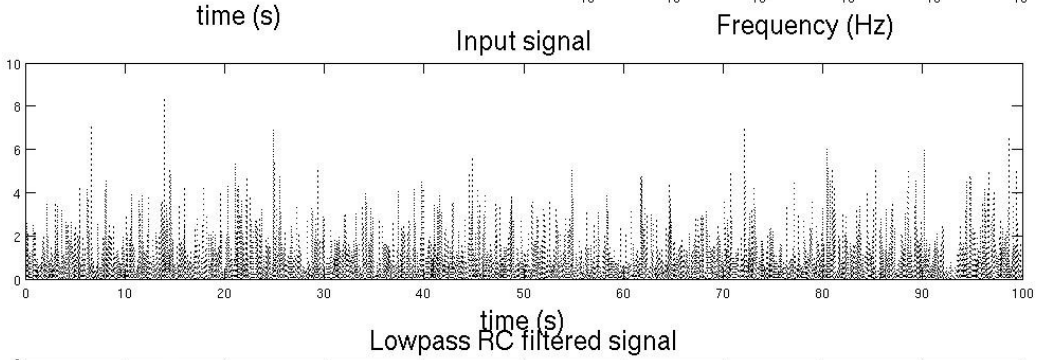
```
clear all; close all;

Fs   = 500;
B    = 160;
v0   = 100;
Dnu  = 16;
T    = 100;
ordre= 6;
sigma= sqrt(5);

%% Exercice 1.1:
figure(1);
Xp = struct('sigma',sigma,'Fs',Fs,'B',B,'T',T) ;
[X,Xp] = CGN(Xp);

moyX = mean(X.data);
varianceX = (std(X.data))^2;
sig0 = varianceX/(2*B);

rep11 = sprintf('Rep1.1:\n La moyenne = %d \n La variance = %d \n sig0 =
%d',moyX,varianceX,sig0);
disp(rep11);
%% Exercice 1.2:
figure(2);
Fp = struct('Fs',Fs,'F0',v0,'Dnu',Dnu,'order',ordre,'class','BP filter');
[Y,Fp ] = BPF(X,Fp);
```

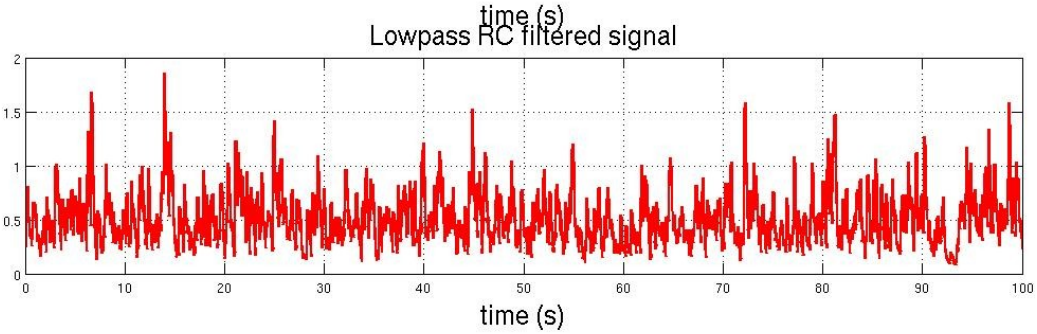
```
moyY      = mean(Y.data);
varianceY = (std(Y.data))^2;
densite = varianceY/(2*Dnu);

rep11 = sprintf('Rep1.2:\n La moyenne = %d \n La variance = %d \n Densite =
%d',moyY,varianceY,densite);
disp(rep11);

%% Exercice 1.3:
[Z] = SquareSig(Y);
prod = [2,20,100];

for i=1:length(prod)
   figure(2+i);
   RC = prod(i)/Dnu;
   RCFp = struct('Fs',Fs,'RC',RC);
   [W,RCFp] = RCF (Z,RCFp);

   W_c = W.data( find(W.time > 5*RC) );

   moyW      = mean(W_c);
   varianceW = (std(W_c))^2;
   kurt      = kurtosis(W_c);
   rep13 = sprintf('Rep1.3: \n Dnu x RC = %d, \n RC = %d \n La moyenne = %d \n La variance
= %d \n Kurtosis = %d',prod(i),RC,moyW,varianceW,kurt);
   disp(rep13);
end
```

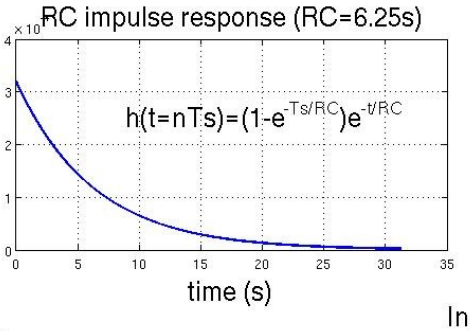
Figure 3 :

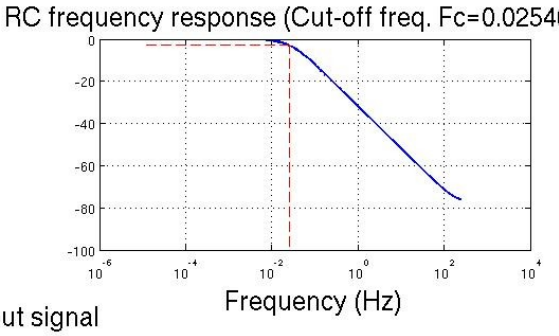

RC impulse response (RC=0.125s)
h(t=nTs)=(1-e^-Ts/RC)e^-t/RC
time (s)

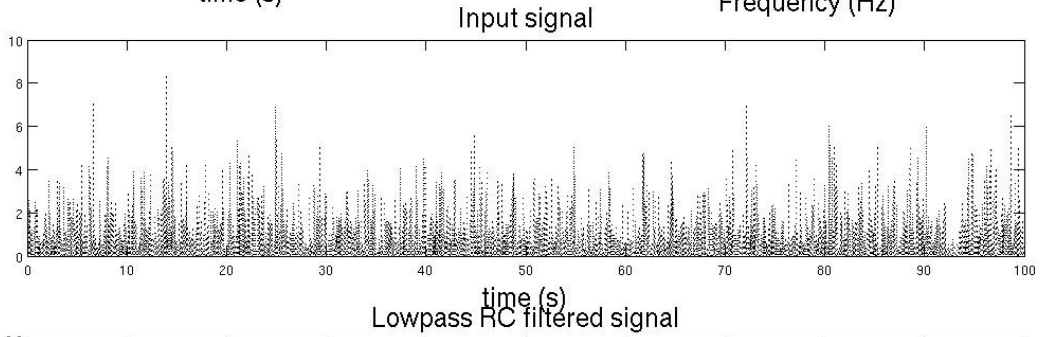

RC frequency response (Cut-off freq. Fc=1.2732Hz)
Frequency (Hz)

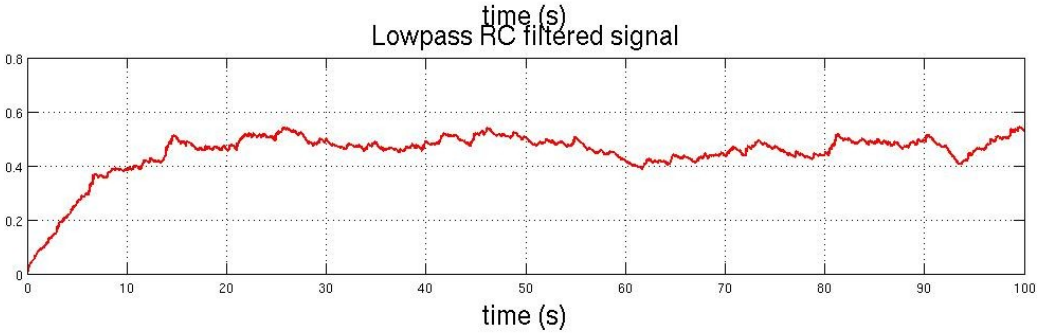

Input signal
time (s)


Lowpass RC filtered signal
time (s)


RC impulse response (RC=6.25s)
h(t=nTs)=(1-e^-Ts/RC)e^-t/RC
time (s)


RC frequency response (Cut-off freq. Fc=0.025465Hz)
Frequency (Hz)


Input signal
time (s)


Lowpass RC filtered signal
time (s)

Partie 2 :

ex21 :

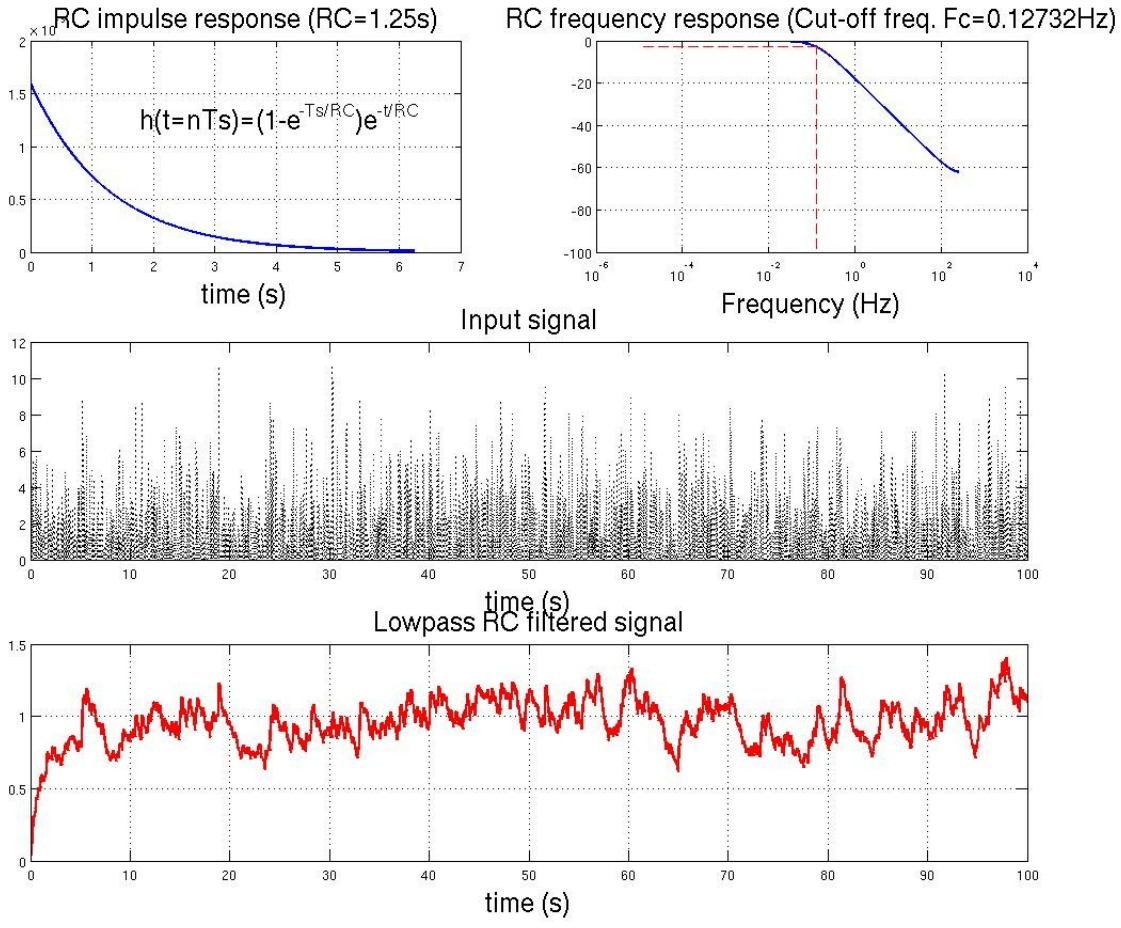
```
clear all; close all;

Fs   = 500;
B    = 160;
v0   = 100;
Dnu  = 16;
T    = 100;
ordre= 6;
sigma= sqrt(5);
A = 1;

%% Generation du signal sinusoidal 100Hz
figure(1);

Sp = struct('Fs',Fs,'A',A,'Fc',v0,'FM',0,'Phi',0,'T',100,'W',[]);
[S,Sp,M] = OOK(Sp) ;

%% Passage du signal par un filtre passe-bande
figure(2);
Fp = struct('Fs',Fs,'F0',v0,'Dnu',Dnu,'order',ordre,'class','BP filter');
[Y,Fp] = BPF(S,Fp);

moyY      = mean(Y.data);
varianceY = (std(Y.data))^2;
densite = varianceY/(2*Dnu);

rep21 = sprintf('Rep21:\n La moyenne = %d \n La variance = %d \n Densite =
%d',moyY,varianceY,densite);
disp(rep21);
```

Ex22 :

```
clear all; close all;

Fs   = 500;
B    = 160;
v0   = 100;
Dnu  = 16;
T    = 100;
ordre= 6;
sigma= sqrt(5);
A = 1;


%% Generation de S(t):
figure(1);

Sp = struct('Fs',Fs,'A',A,'Fc',v0,'FM',0,'Phi',0,'T',100,'W',[]);
[S,Sp,M] = OOK(Sp) ;

%% Generation du bruit:
figure(2);
Xp = struct('sigma',sigma,'Fs',Fs,'B',B,'T',T) ;
[B,Xp] = CGN(Xp);
```

```
%% Addition des signaux:
[X] = AddSig(S,B);

%% Filtrage bande-passante
figure(3);
Fp = struct('Fs',Fs,'F0',v0,'Dnu',Dnu,'order',ordre,'class','BP filter');
[Y,Fp] = BPF(X,Fp);

%% Quadrateur + filtrage passe-bas
[Z] = SquareSig(Y);
prod = [2,20,100];

for i=1:length(prod)
   figure(3+i);
   RC = prod(i)/Dnu;
   RCFp = struct('Fs',Fs,'RC',RC);
   [W,RCFp] = RCF (Z,RCFp);

   W_c = W.data( find(W.time > 5*RC) );

   moyW = mean(W_c);
   B_s = std(W_c);
   rep  = sprintf('Rep: \n RC x Dnu = %d \n RC = %d \n Moyenne W_S+B = %d \n B_s =
%d',prod(i),RC, moyW, B_s);
   disp(rep);
end
```

Figure 4 :



Partie 3 :

Ex31 :

```
clear all; close all;

Fs   = 500;
B    = 160;
v0   = 100;
FM   = 0.05;
Dnu  = 16;
T    = 100;
ordre= 6;
sigma= sqrt(5);
A = 1;


%% Generation de S(t):
figure(1);

Sp = struct('Fs',Fs,'A',A,'Fc',v0,'FM',FM,'Phi',0,'T',100,'W',[]);
[S,Sp,M] = OOK(Sp) ;

%% Generation du bruit:
figure(2);
Xp = struct('sigma',sigma,'Fs',Fs,'B',B,'T',T) ;
[B,Xp] = CGN(Xp);

%% Addition des signaux:
[X] = AddSig(S,B);

%% Filtrage bande-passante
figure(3);
Fp = struct('Fs',Fs,'F0',v0,'Dnu',Dnu,'order',ordre,'class','BP filter');
[Y,Fp] = BPF(X,Fp);

%% Quadrateur + filtrage passe-bas
[Z] = SquareSig(Y);
prod = [2,20,100];

for i=1:length(prod)
   figure(3+i);
   RC = prod(i)/Dnu;
   RCFp = struct('Fs',Fs,'RC',RC);
   [W,RCFp] = RCF (Z,RCFp);

   W_c = W.data( find(W.time > 5*RC) );

   moyW = mean(W_c);
   B_s = std(W_c);
   rep  = sprintf('Rep: \n RC x Dnu = %d \n RC = %d \n Moyenne W_S+B = %d \n B_s =
%d',prod(i),RC, moyW, B_s);
   disp(rep);
end

%% Comparaison
seuil= 0.7;
M = W.data>seuil;

figure(7);
```

```
subplot(4,1,1);
plot(S.time,S.data);
xlabel('time(s)');
title('Le signal original');

subplot(4,1,2);
plot(X.time,X.data);
xlabel('time(s)');
title('Le signal bruite')

subplot(4,1,3);
plot(W.time,W.data);
xlabel('time(s)');
title('L estimation du Puissance');

subplot(4,1,4);
area(W.time,M);
xlabel('time(s)');
title('L estimation seuillee');
```

Figure 5 :