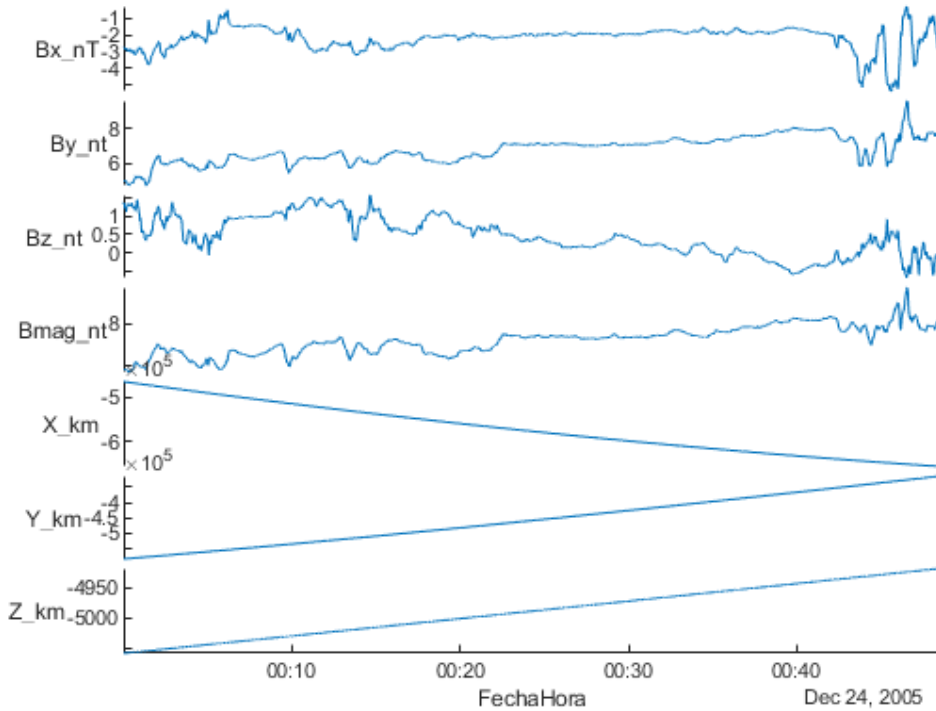


Descomposición espectral

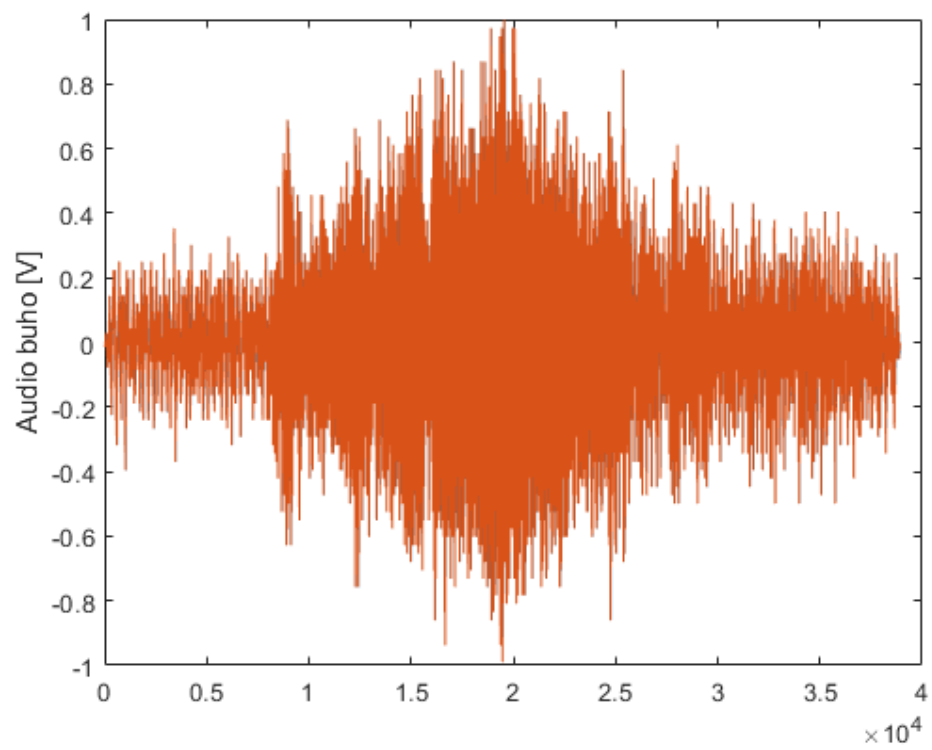
```
load("../..Clase Github/Utils4SP/Datasets/S5_Estadistica101_LaVenganza.mat")
```

Previsualización

```
figure  
stackedplot(Cassini,"XVariable","FechaHora")
```

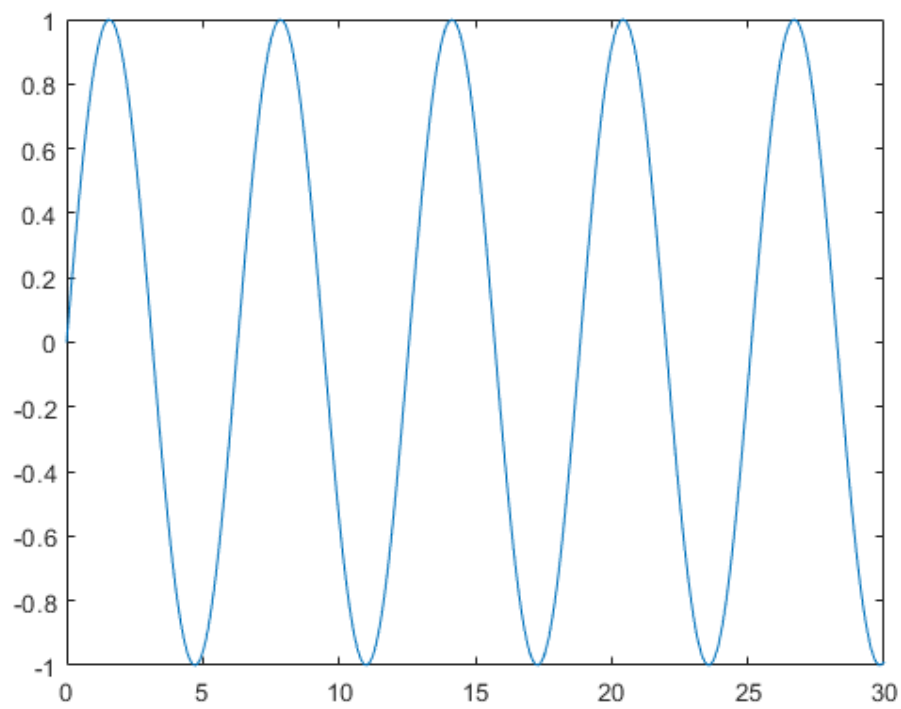


```
figure  
plot(buho)  
ylabel("Audio buho [V]")
```

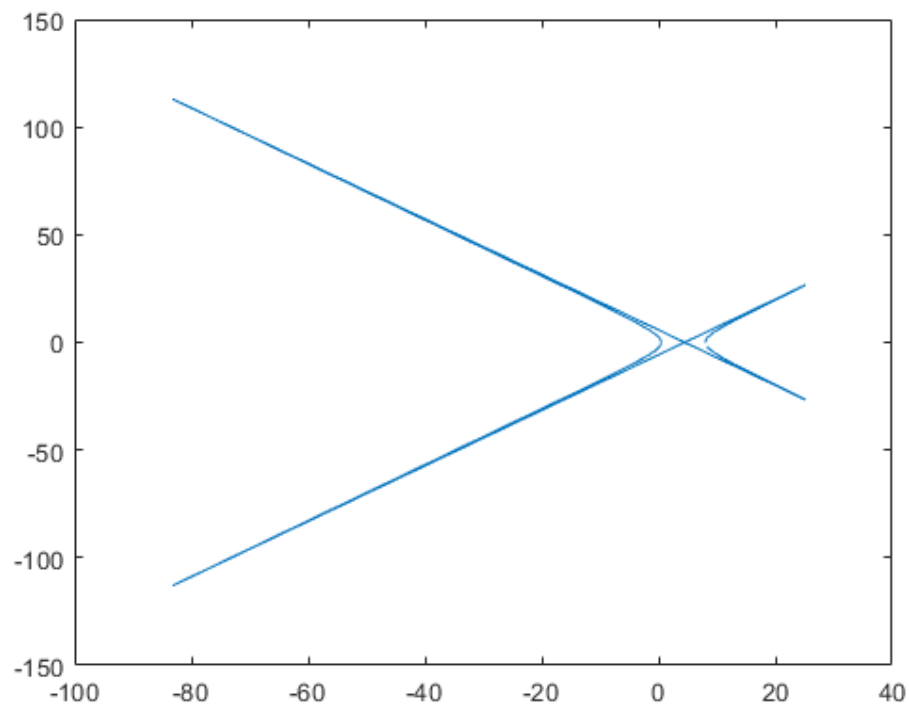


FFT

```
Ts=0.1;  
fs=1/Ts;  
N=numel(X_1);  
t=0:Ts:30;  
x=@(t) sin(t);  
X_1=x(t);  
figure  
plot(t,X_1)
```

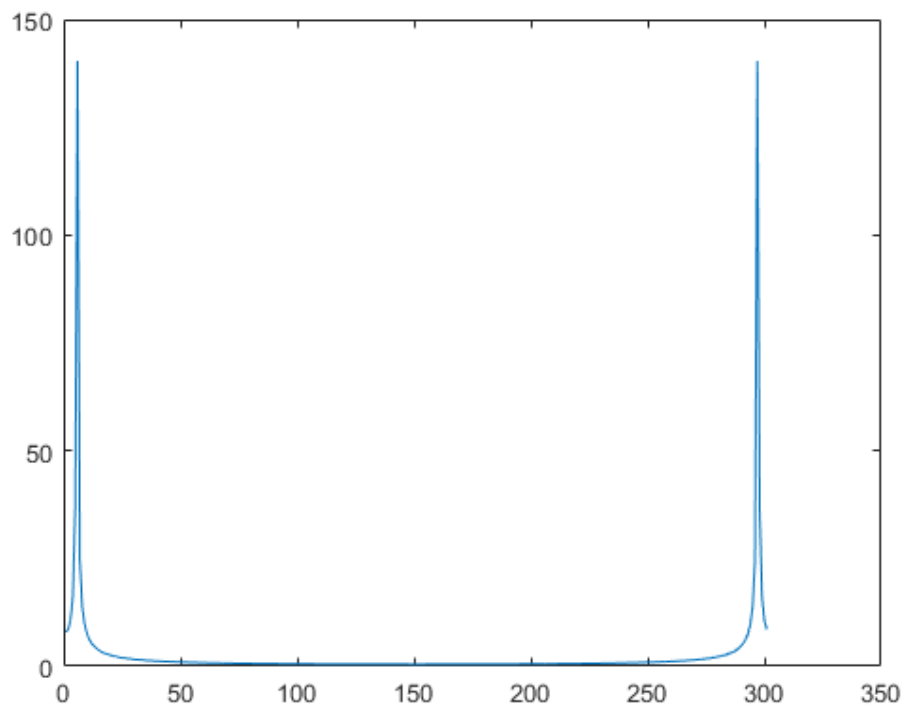


```
X=fft(X_1);  
figure  
plot(X)
```

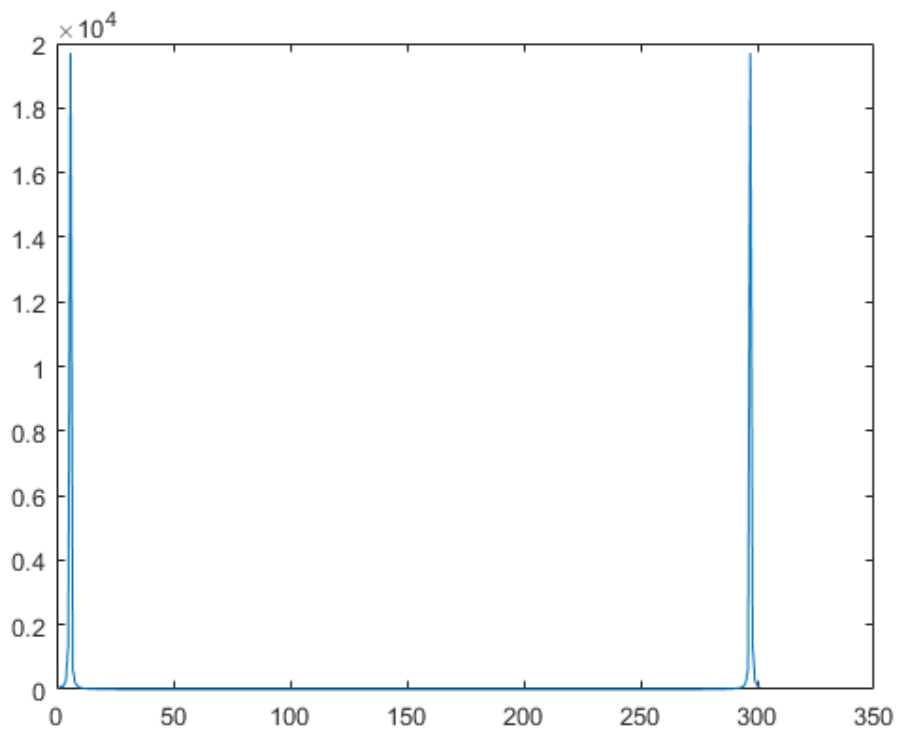


```
%Graficamos magnitud de X
```

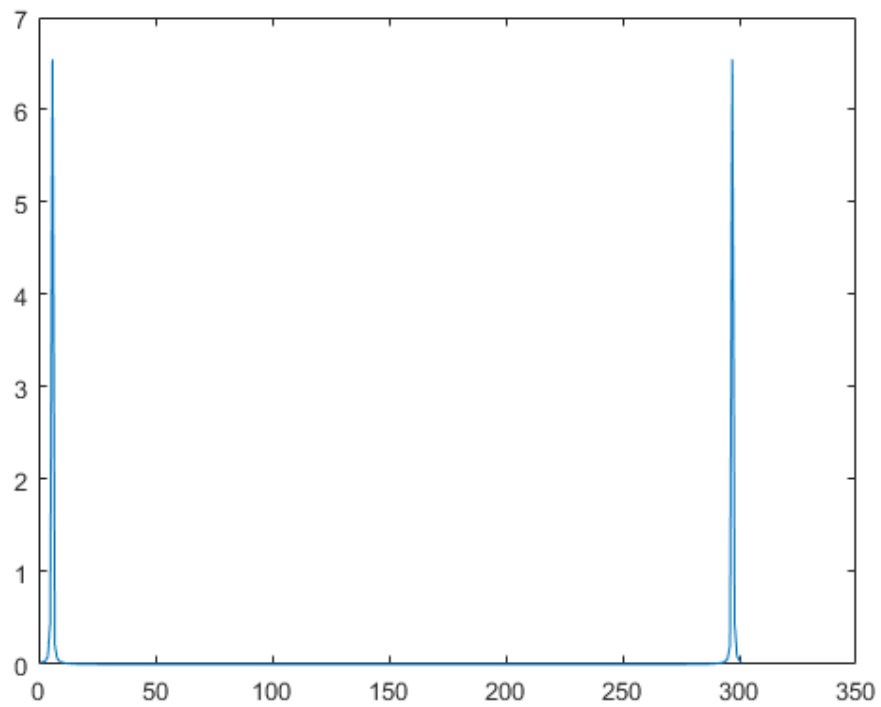
```
figure  
plot(abs(X))
```



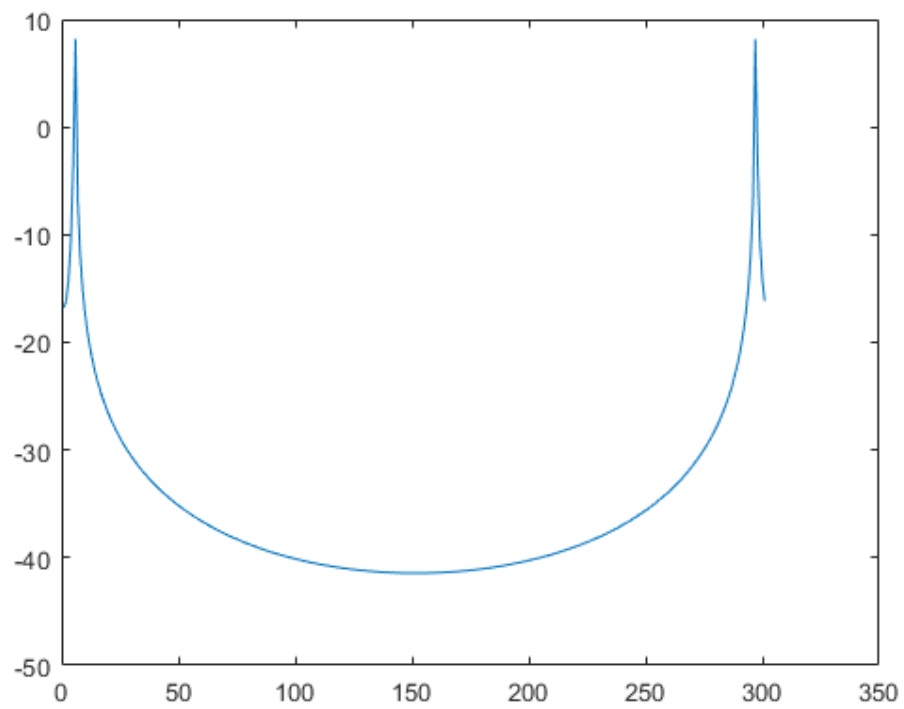
```
energyDensity=(abs(X)).^2;  
figure  
plot(energyDensity)
```



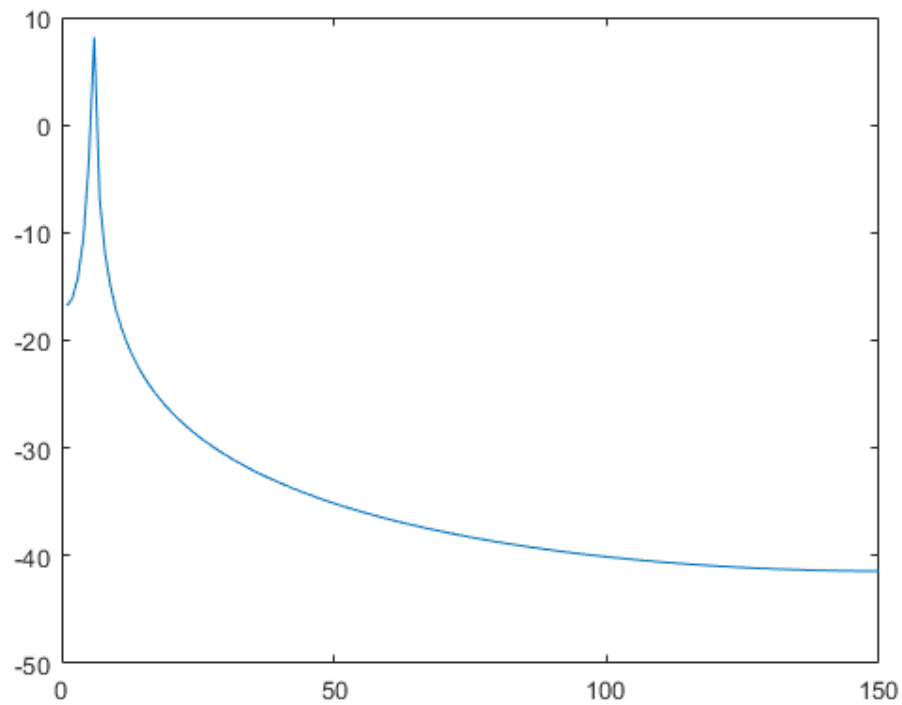
```
powerDensity=(1/(N*fs))*energyDensity;  
figure  
plot(powerDensity)
```



```
%Lo pasamos a decibeles  
powerdB=10*log10(powerDensity);  
figure  
plot(powerdB)
```



```
energyDensity_2=energyDensity(1:floor(N/2));  
N_energySpectrum=numel(energyDensity_2);  
powerDensity_2=energyDensity_2./(N.*fs);  
powerdB_2=10*log10(powerDensity_2);  
figure  
plot(powerdB_2)
```

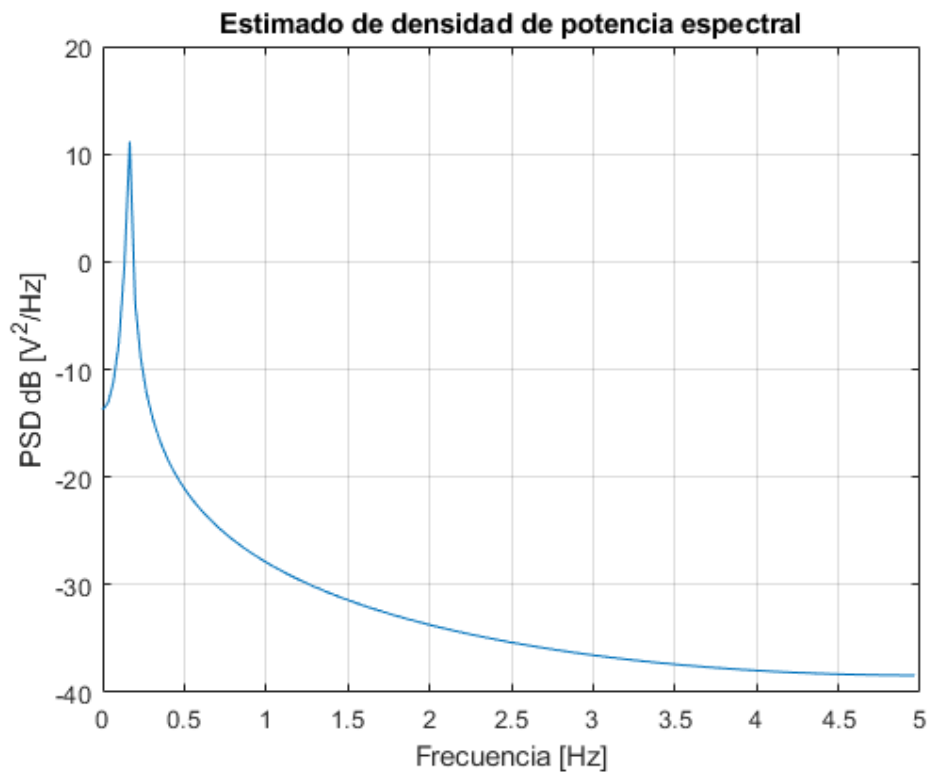


Eje de frecuencias

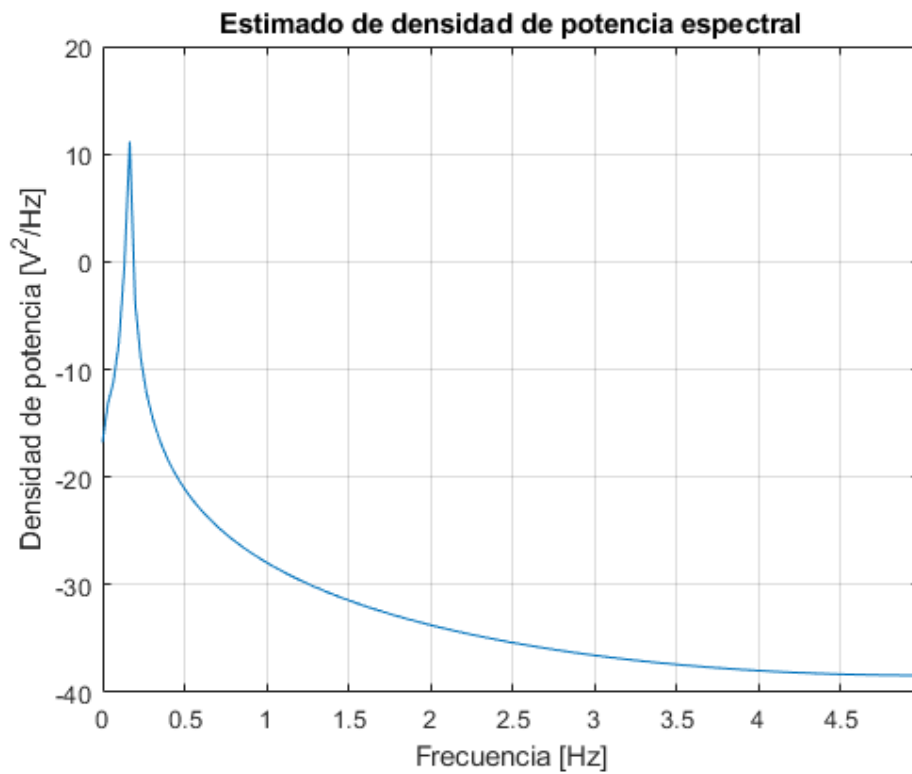
```
%Teorema de Nyquist: f_max<fs/2
%Frecuencia de Nyquist
f_Nyquist=fs/2;
%Resolución en frecuencia
%Df=fs/N
Df=fs/N_energySpectrum;
%Nota: fs alta
% + randog dinámico
% + resolución
f=(0:N_energySpectrum-1)./(N_energySpectrum).*f_Nyquist;
```

Brillitos para el contenido espectral

```
figure
%"pow2db" es una función de Matlab
plot(f,pow2db(2.*powerDensity_2))
title("Estimado de densidad de potencia espectral")
xlabel("Frecuencia [Hz]")
ylabel("PSD dB [V^2/Hz]")
grid on
```

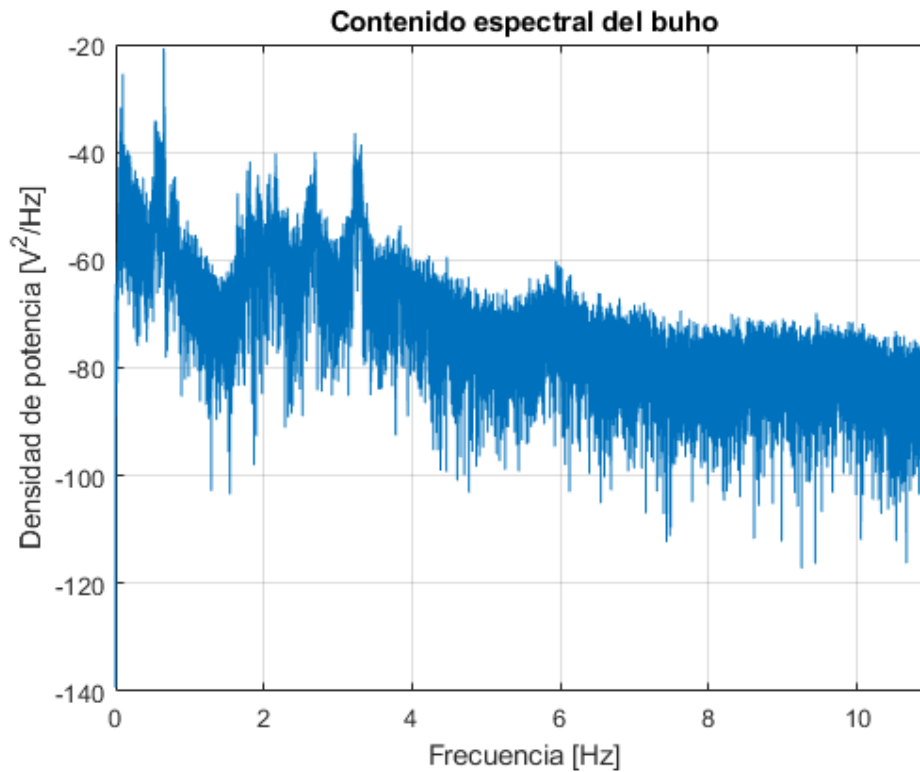


```
figure
periodogram(X_1,[],N,fs)
ylabel("Densidad de potencia [ $V^2/Hz$ ]")
xlabel("Frecuencia [Hz]")
title("Estimado de densidad de potencia espectral")
```



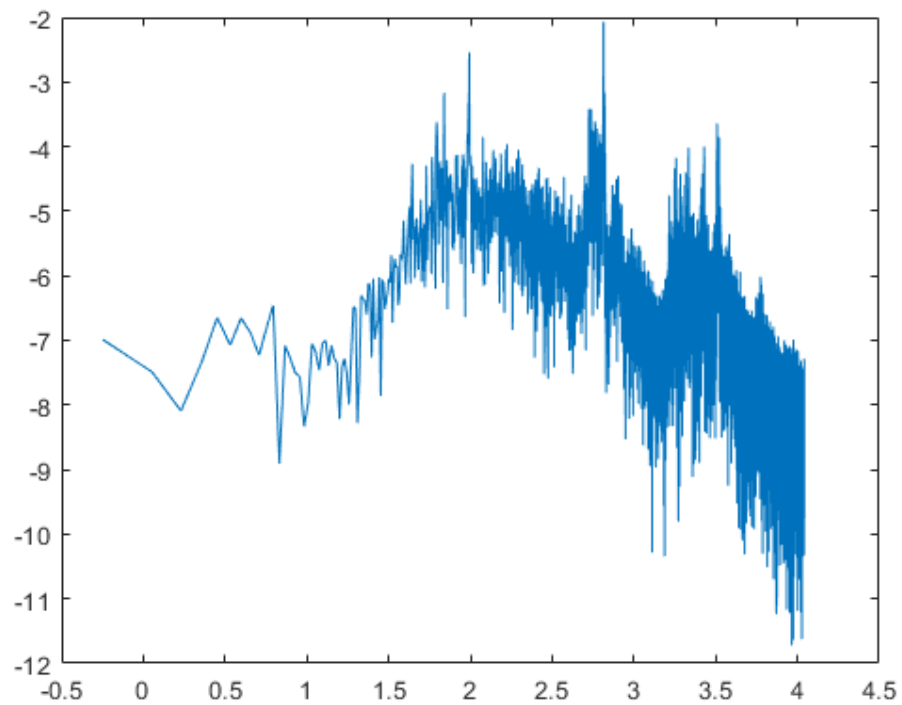
Periodogram para el buho

```
N_buho=numel(buho_left);  
figure  
periodogram(buho_left,[],N_buho,fs_buho)  
ylabel("Densidad de potencia [V^2/Hz]")  
xlabel("Frecuencia [Hz]")  
title("Contenido espectral del buho")
```



Sacar datos del periodograma

```
[Pxx,F]=periodogram(buho_left,[],N_buho,fs_buho);  
figure  
plot(log10(F),log10(Pxx))
```



Espectrograma

```
%Cuidado con la RAM  
N_spectrogram=round(N_buho/100);  
figure  
spectrogram(buho_left,N_spectrogram,0,[],fs_buho)
```

