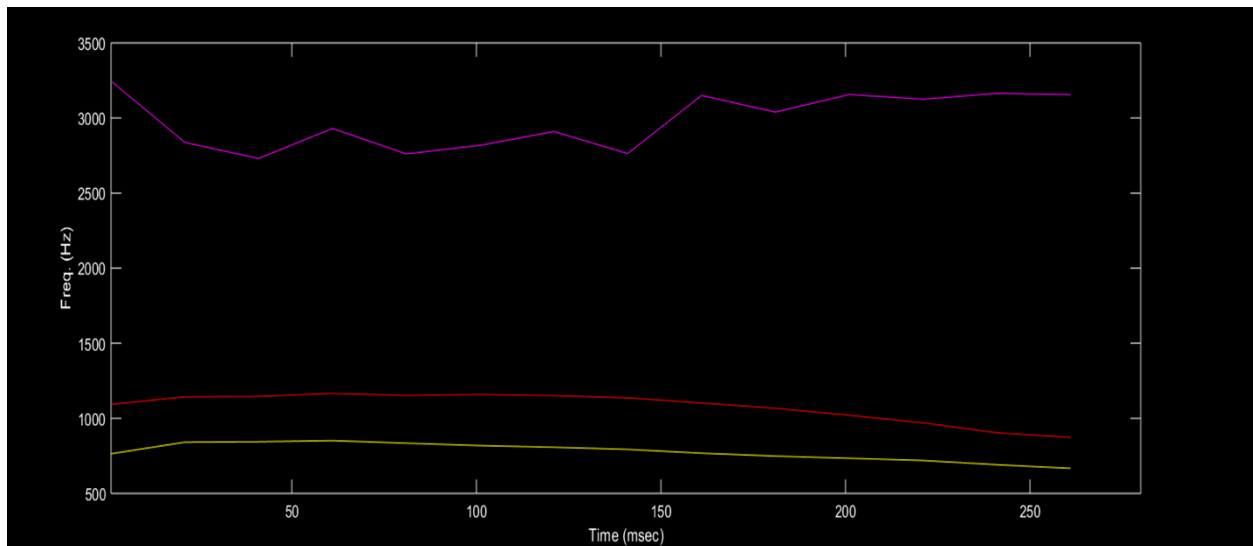
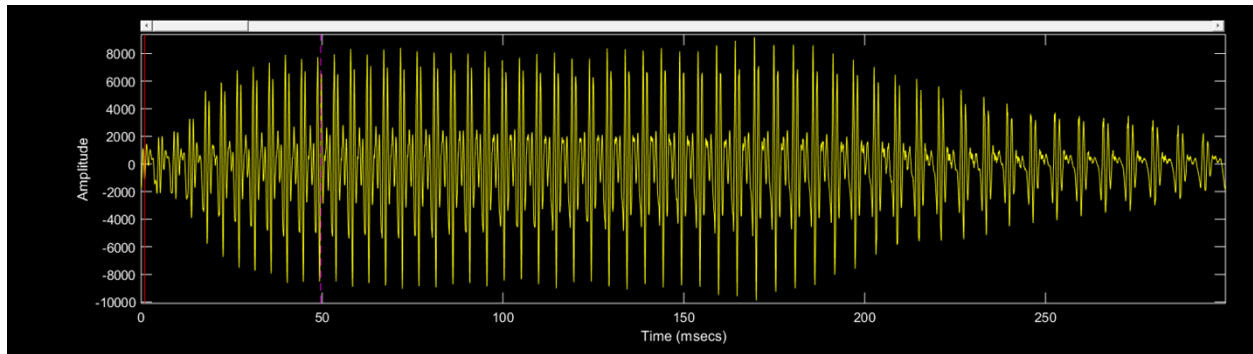


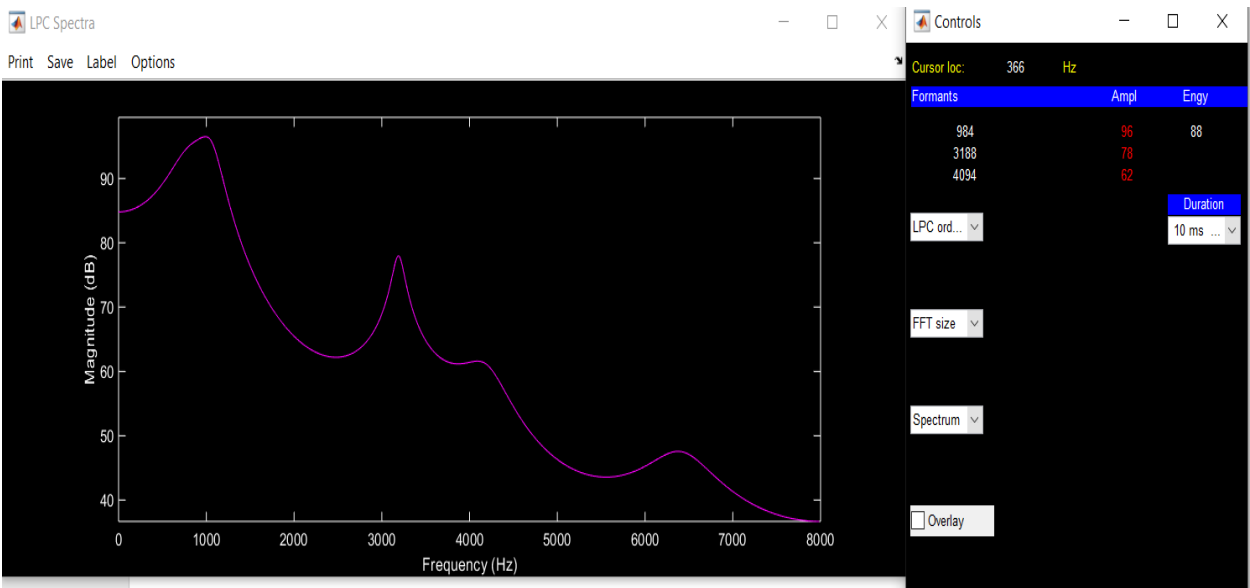
Estimarea frecvenței formantilor

Folosim fisierul audio **a** from **hall.wav** decupat cu ajutorul audacity din **hall.wav**

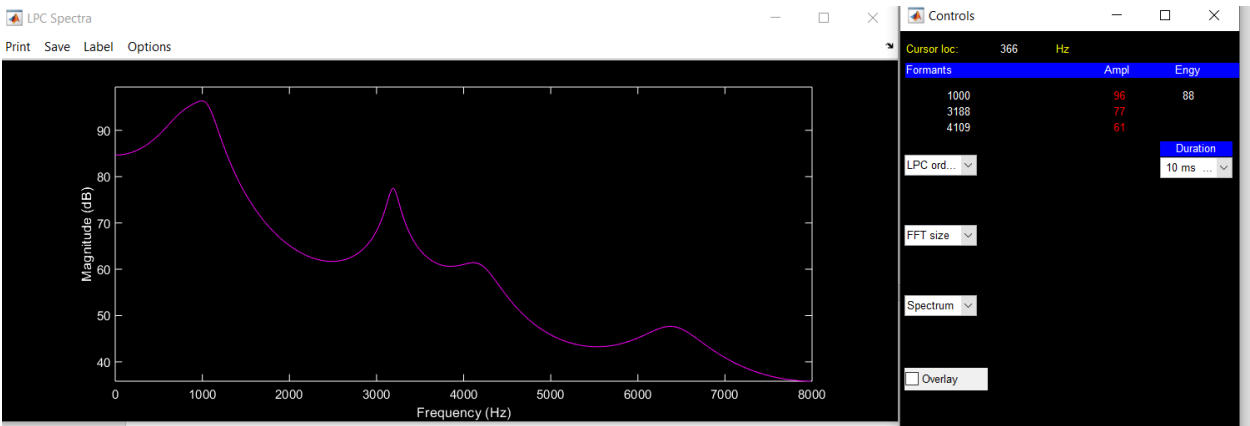
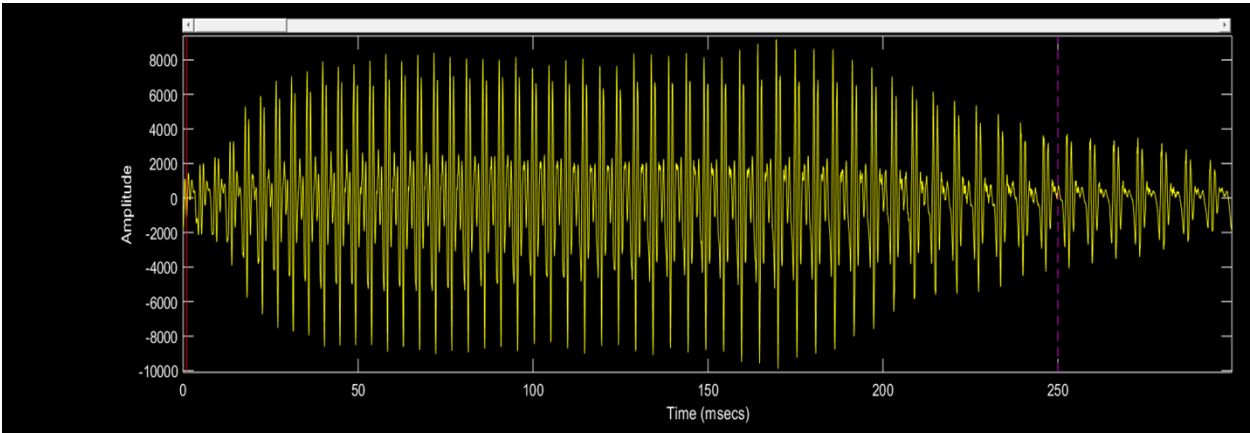
Cursorul pe 0-50ms

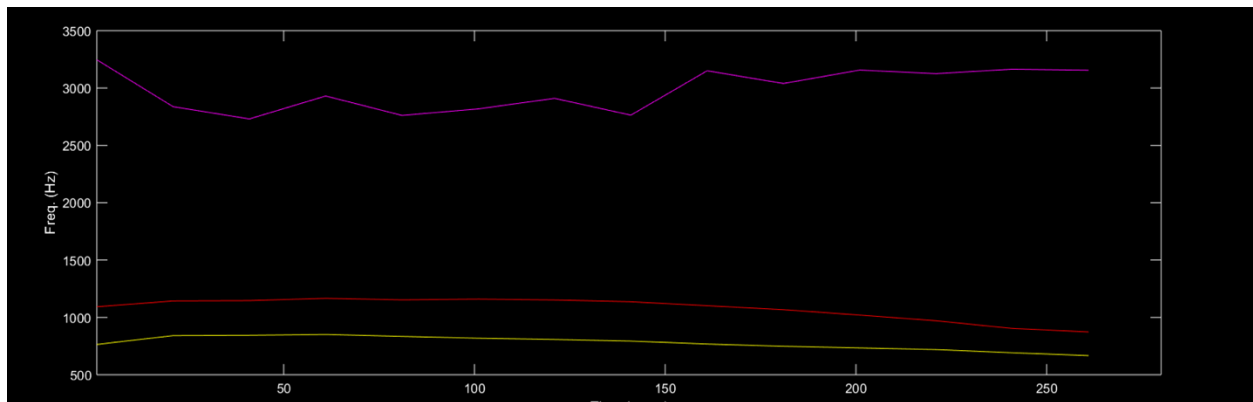


Gal Oscar – Laborator 4



0-250ms





=>Putem spune ca Formant Track e același pt orice interval de timp

Codul:

Pentru intervalul [1 500]

```
% MODEL determinare frecvente Formanti din spectrul
fitrului de LP
% get a section of vowel
%[x, fs] =
audioread('/Users/galoscar07/Desktop/master2k20/ASRSV/labor
atory/Colea/a from hall.wav',[1 1]);
[x,fs]=audioread('/Users/galoscar07/Desktop/master2k20/ASRS
V/laboratory/Colea/a from hall.wav',[1 500]);
% resample to 10,000Hz (optional)
x=resample(x,10000,fs);
fs=10000;

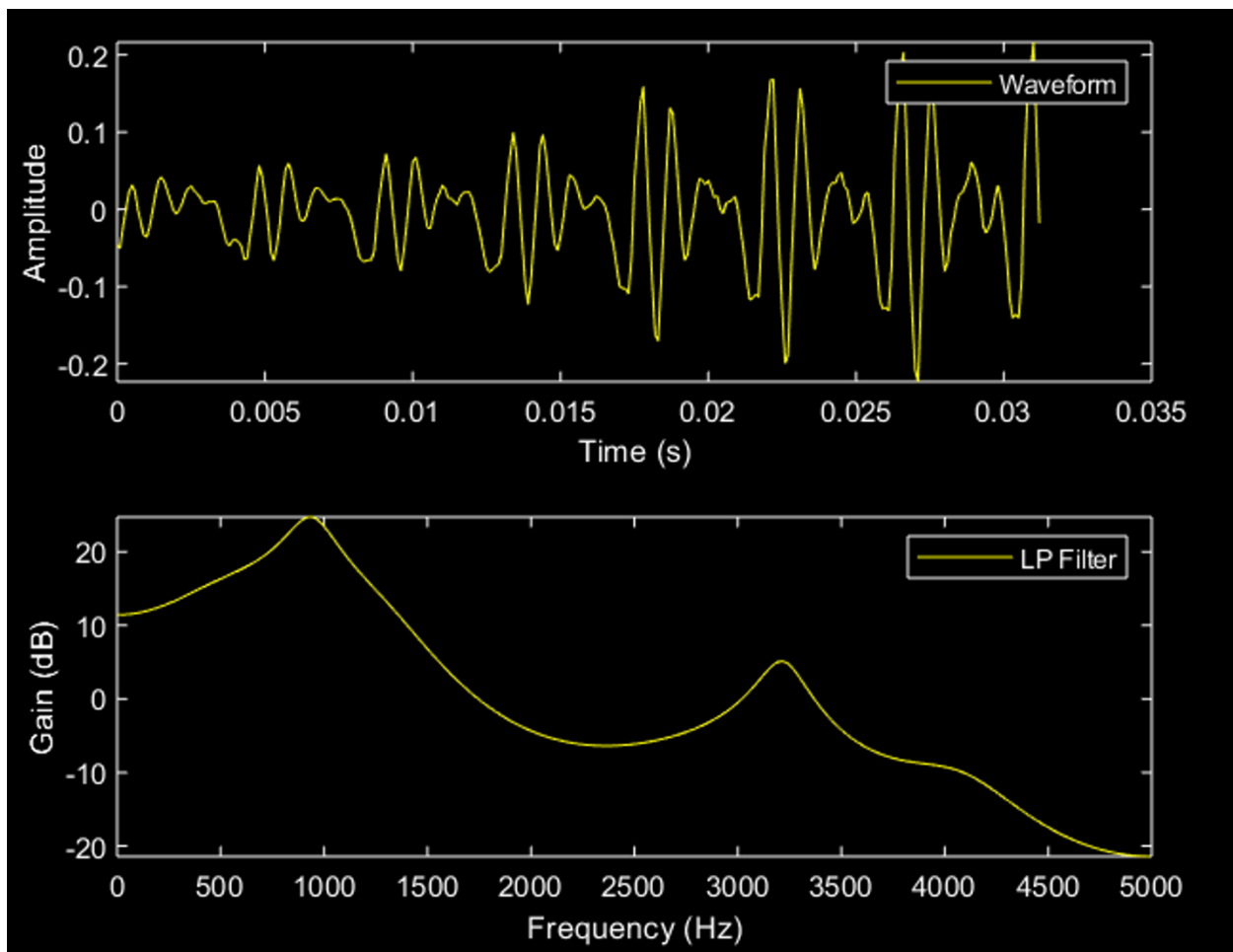
% plot waveform
t=(0:length(x)-1)/fs; % times of sampling instants
subplot(2,1,1);
plot(t,x);
legend('Waveform');
xlabel('Time (s)');
ylabel('Amplitude');
%
% get Linear prediction filter
ncoeff=2+fs/1000; % rule of thumb for formant estimation
a=lpc(x,ncoeff);
%
% plot frequency response
[h,f]=freqz(1,a,512,fs);
subplot(2,1,2);
plot(f,20*log10(abs(h)+eps));
```

```

legend('LP Filter');
xlabel('Frequency (Hz)');
ylabel('Gain (dB)');

% find frequencies by root-solving
r=roots(a); % find roots of polynomial a
r=r(imag(r)>0.01); % only look for roots >0Hz up to fs/2
ffreq=sort(atan2(imag(r),real(r))*fs/(2*pi));
% convert to Hz and sort
for i=1:length(ffreq)
fprintf('Formant %d Frequency %.1f\n',i,ffreq(i));
end

```

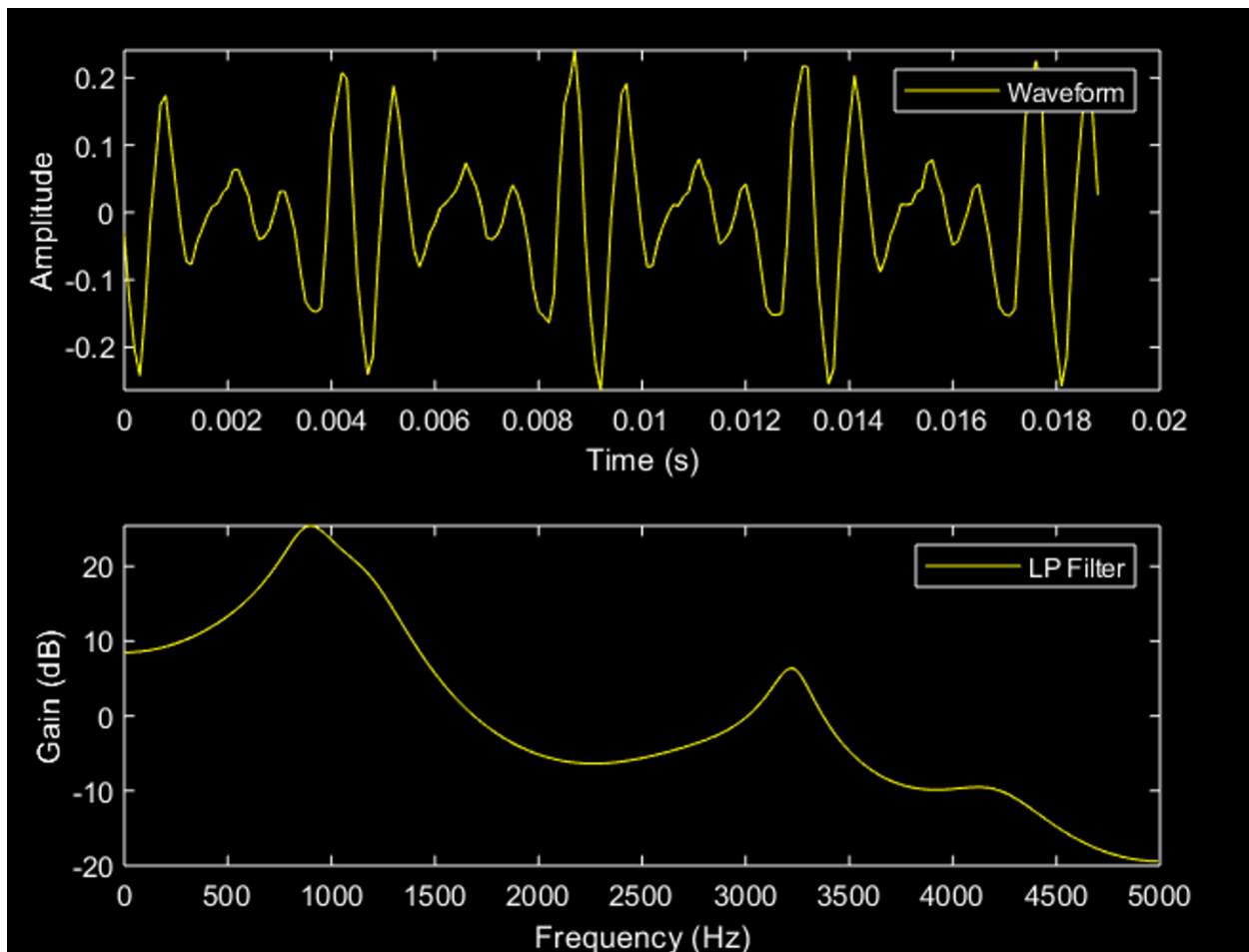


Command Window

```
>> lab4_aplicatie  
Formant 1 Frequency 489.0  
Formant 2 Frequency 938.7  
Formant 3 Frequency 1295.2  
Formant 4 Frequency 2747.7  
Formant 5 Frequency 3216.9  
Formant 6 Frequency 4086.7
```

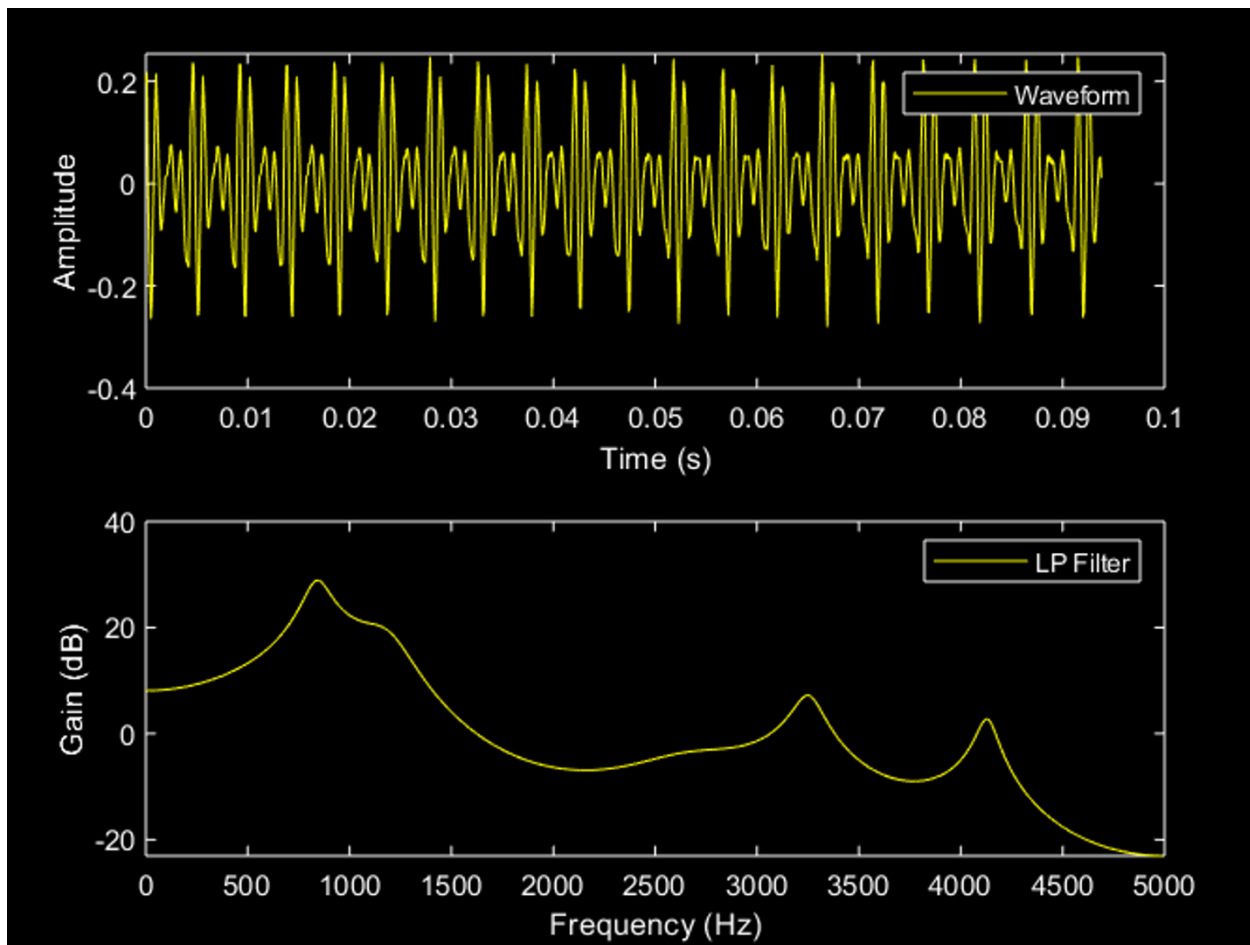
fx >>

Pentru intervalul [500 800]



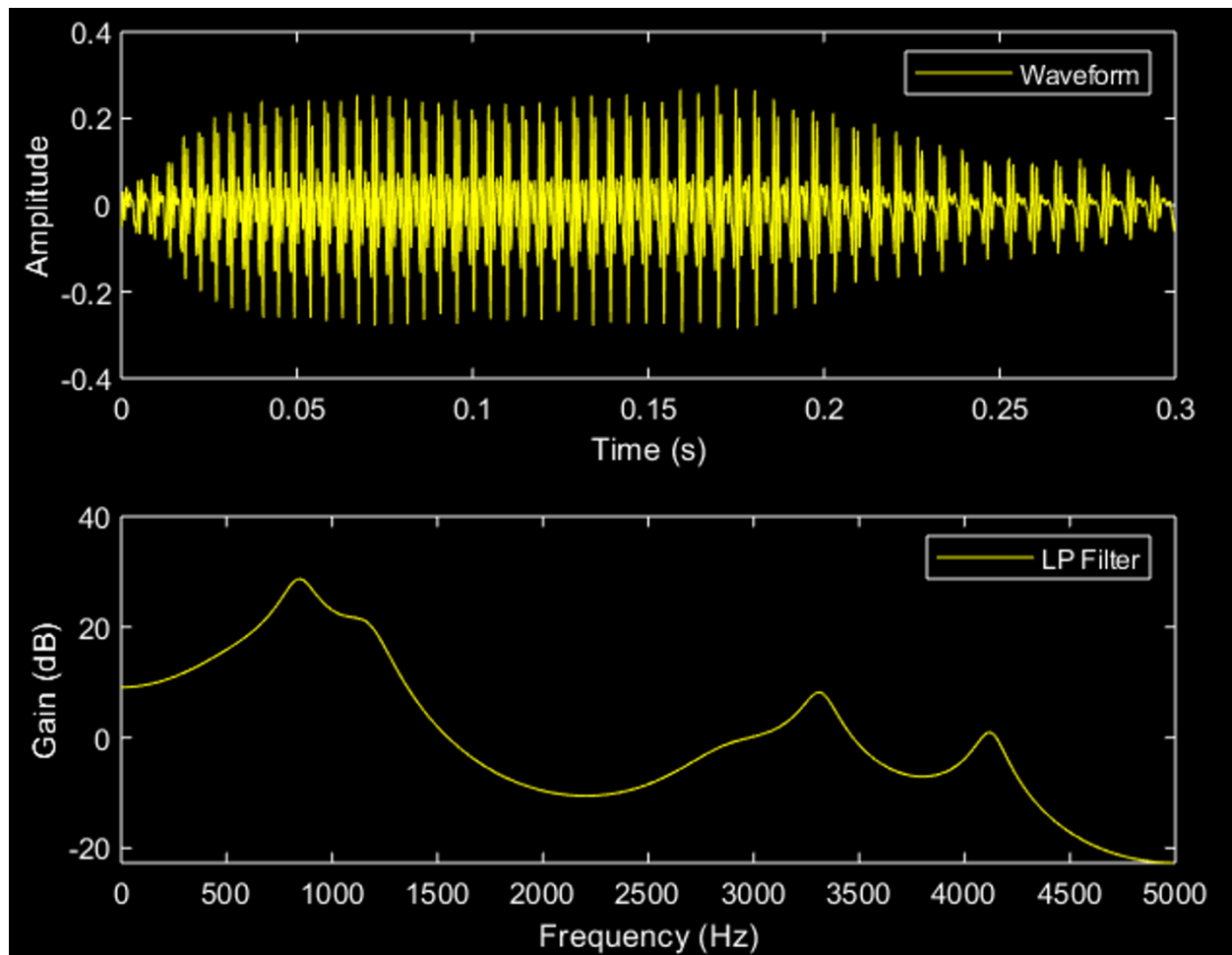
```
>> lab4_aplicatie  
Formant 1 Frequency 546.5  
Formant 2 Frequency 886.9  
Formant 3 Frequency 1192.2  
Formant 4 Frequency 2724.7  
Formant 5 Frequency 3227.1  
Formant 6 Frequency 4213.2
```

intervalul [1000 2500]



```
>> lab4_aplicatie  
Formant 1 Frequency 491.2  
Formant 2 Frequency 838.8  
Formant 3 Frequency 1192.4  
Formant 4 Frequency 2657.8  
Formant 5 Frequency 3252.7  
Formant 6 Frequency 4130.5
```

Pentru intregul semnal



```
>> lab4_aplicatie  
Formant 1 Frequency 524.7  
Formant 2 Frequency 843.2  
Formant 3 Frequency 1177.6  
Formant 4 Frequency 2872.5  
Formant 5 Frequency 3316.1  
Formant 6 Frequency 4124.3
```

Putem observa ca in functie de intervalul ales pentru cadre, formantii rezultati au diferite valori ale frecventei.

Exista o diferenta intre rezultatele obtinute in Colea si implementarea noastra, deoarece in Colea in functie de fiecare cadru ales rezulta cate 3 formanti, iar in implementarea aleasa de noi rezulta cate 6 formanti.