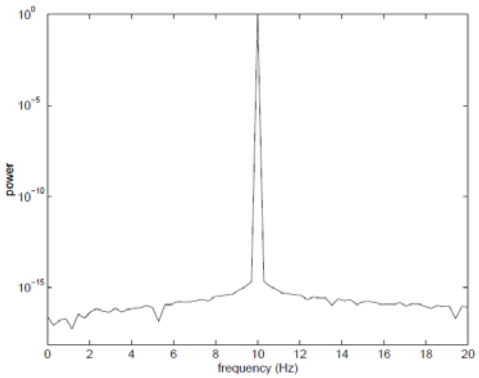
MATLAB, Lab 9 – Group work

Usually `fft` is used in order to obtain power spectrum of the signal (signal power vs frequency). It allows to distinguish the dominating frequencies in the signal. The example of power spectrum of signal is presented below. One can notice the main peak corresponding to 10Hz and the noise of the order 10e-15 which is caused by the round-off error.



This type of analysis is used in different applications. Dominating frequencies can be found in any type of 1 dimensional signals (voltage, pressure, sound amplitude etc.) or 2 dimensional signals (graphics, ocean waves etc.).

Task

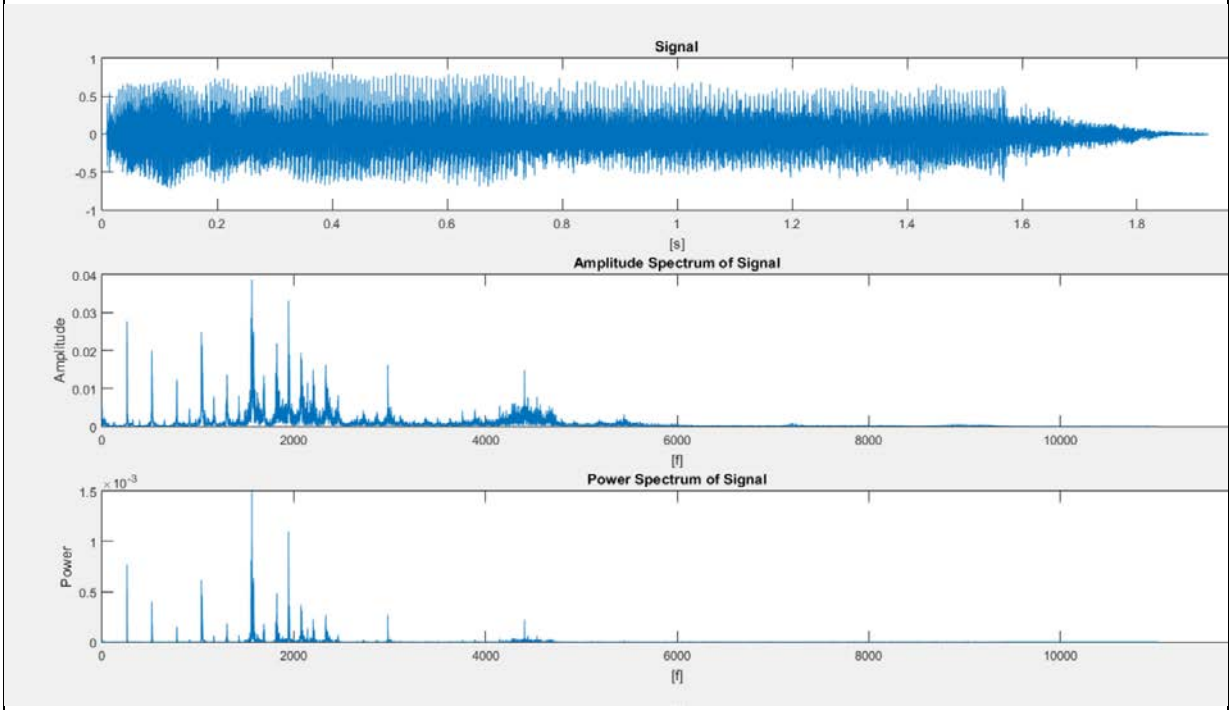
1. Load the file alarm.wav into Matlab with the use of `wavread` function. Perform FFT analysis of the signal and calculate the amplitude and power spectra. Paste the script created in that task. Provide screenshots of the signal and obtained amplitude and power spectra. Add some comments about the detected sound frequencies and their features.

Code:

```
[y,fs] = wavread('Alarm.wav');
t=linspace(0,length(y)/fs,length(y));

C= fft(y);
N = length(y);
n = floor((N+1)/2);
f = fs/2*linspace(0,1,n);

subplot(3,1,1)
plot(t,y);
title('Signal');
xlabel('[s]');

amplitude = (2/N)*abs(C(1:n));
subplot(3,1,2)
plot(f,amplitude);
title('Amplitude Spectrum of Signal')
xlabel('[f]');
ylabel('Amplitude');

power = amplitude.^2;
```

```
subplot(3,1,3)
plot(f,power);
title('Power Spectrum of Signal');
xlabel('[f]');
ylabel('Power');
```

Screenshot:



Comments:

2. Use one of methods learned in previous lecture to calculate the total sound power from power spectrum. Hint: sampling frequency could be read from file also with `wavread` function, check syntax in help.

Result: