

Work 1

FREQUENCY ANALYSIS OF SIGNALS USING MATLAB

D) Frequency analysis 3

In this part we import the signals to be analysed from a file and examine changes in amplitude and frequency of our own voice.

Listing square1.m created in part C can be used as ground for the frequency analyses.

D1 ● Start Goldwave voice recording program from desktop. Instructions for using the program are nearby your workstation. Record a vocal 'a' by repeating it to microphone. Duration of your sound file must be exactly one second. Save the voice by name aaa1 to the directory named by assistant. To be sure the sound is clear and not distorted, listen the recorded sound in Goldwave and change the distance to microphone if needed.

Hint: Begin to produce the voice before starting to record. Try to keep your voice stable, which makes the signal periodic. The purpose of this assignment is to show that a periodic signal consists of a sum of cosine waves, so in the spectrum there ought to be only impulses at certain frequencies.

- Before another voice sample change the load –line in the listing for example to form

```
[x,Fs] = wavread( 'D:\student\aaa1.wav' );
```

,so Matlab will be able to load the soon created sound file. Variable x is a voice sample vector and Fs is sample frequency that comes automatically with wav-file.

- Set %-mark in front of signal x (since signal x will get its value from the voice signal)

```
%x = name;
```

- Save the new listing by name sound1 to the same directory as before.

- Run the listing and make changes to scales. Change also the information in the title to match to the person who gave the sample. When necessary, give a new voice sample. When the graph is clearly interpretable, print the graph to the person who gave the sample.

- Record then voices "aaa", a whistle and a noise ("sssss") for both members of the group. Save each voice to the directory named by the assistant by an appropriate name, for example iii2 ect.

- Import then one voice at a time to Matlab and run the listings. Change scales to be suitable. Change also titles to correspond to given voice. When necessary, give a new sample. When the graph is clearly interpretable, print the graph for the person who gave the sample.

- Answer the following questions now. Ask then for the assistant to check the answers.

What is the first harmonic of either one member in the group? Circle it from the "aaa" –presentation and mark the value to the picture! Hint: with zoom you can get the exact value!

Interpretation from the noise –voice? _____

In the report there should be answers to the next questions!

- @ Present a summary of your own voice samples. Periodicity, frequency components etc.
- @ Compare the spectra of same person with each other. Make notes to graphs.
- @ Compare the spectra of different group members with each other.



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Laboratory work 1, assignments

@ Why are there spectrum components near 0 Hz (0 - about 10 Hz)? @ Why aren't the spectrum components impulses but broaden ones?

FAMILIARIZE YOURSELF WITH THE REPORT INSTRUCTIONS!

Deadline for the report is ____ / ____ 200__ at 4 pm.