Laboratory work 3
STUDYING OF PULSES AND RANDOM SIGNALS

C) Statistical analysis of random signals

The speech of human being is random, but also partly predictable. In this part of the work both members of the group give two speech samples. In one of the samples the members say the same word(s). The samples will be analyzed with Matlab.

1. ● Start GoldWave program and save a one second sample of your speech (for example your name or whatever). So make some speech, not only a single vowel etc.

● Save the speech sample you want into d:\sinkut as yourname+1, e.g. ”john1.wav”. Right after that make another sample, for example ”turska haisee” etc. Name and save it as “john2.wav”. Remember that both members must say the same words in the second speech sample!

● Both group members must give the speech samples in the same way (equal durations etc.) and save them in the same directory. Don’t exit GoldWave yet, you may need to regive the samples.

2. ● Write the following macro in Matlab’s editor:

```
% Instead of name1.wav write your own file name!
[xt,Fs] = wavread('d:\sinkut\name1.wav');
t = 0:1/Fs:1-1/Fs;
soundsc (xt,Fs);
specgram (xt,512,Fs,[],475); %Frequencies of the sample in function of time
% Edit the following row so that it fits your needs
title('The spectrogram of John’s speech 10.3.2002, pronounced “turska haisee”');
```

● Save the macro in the directory d:\sinkut as yourname+1, e.g. john01.m. Run the macro and print the spectrogram. Switch the file name in the macro as the second sample of your speech, run the macro and print the spectrogram. Rerecord your sample if needed.

● Edit the macro and print your partners spectrograms.

With some accuracy, the spectrogram tells you how the frequencies of the signal are changing with respect of time. On the other hand windowed Fourier transform shows which frequencies were present inside the chosen time window. So the Fourier transform gives you statistics about which frequencies did appear within a certain time. If the time window is shortened and the Fourier transforms are arranged as one after one in time domain the situation where frequency changes can be seen with respect of time is approached.

@ Examine your own spectrogram. Mark the positions of vowels and consonants (and the name of the vowel and consonant as well) into the picture. Can you see some kind of stress or emphasis (amplitude and frequency changes) in the spectrogram? Is there any amplitude fluttering (frequencies near 0 Hz)? What similarities can you find between your own spectrograms? What about between the second spectrogram of you and your partner (the same word(s) spoken)?