

Laboratory work 3

STUDYING OF PULSES AND RANDOM SIGNALS

What will be done?

In this work we'll get familiar with convolution, non-linear system and random signals with Matlab software. The needed m-files (Matlab macros) are available in the computers that will be used.

In the convolution part the convolution of the two signals of the preliminary questions is calculated. An RC-lowpass filter's output signal is solved using convolution, too. The goal of this part is to understand the meaning of convolution and where it can be applied in time domain signal processing.

A non-linear system is simulated with the signals $x(t)$ and $y(t)$ from the preliminary questions. The time and frequency domain presentations of those signals are calculated with Matlab. The goal is to illustrate the functioning a non-linear system by studying frequency domain presentations.

Speech of a human being will be used as random signal. In this part we'll study the changes of frequency with respect of the time (a spectrogram) and amplitude distributions of signals.

How?

All the parts need applying the mathematics. Therefore, to get all the work done in time requires familiarizing yourselves with the subjects to be considered beforehand.

What to take with?

During the work you will need course book or handouts of the course and tools to make notes and calculations. Course book / handouts you will need for solving the questions.

Documentation during the work

Graphs and macros are printed for each group according to given instructions. Some or all of the results may be sent by e-mail to group members. Observations from listened sound files should be written down. Assistant gives parameters to some assignments. This laboratory work can be made with any of the computers reserved for the work (12).

Reporting

Before the laboratory work each group answers to the preliminary questions and returns the answers to the assistant in the beginning of the work. You can't begin without returned answers. After the laboratory work each group writes a report, which will be returned to a box under the notice board of the course

Grading of the work

The maximum points for the preliminary questions is 35 and for the report 65. Therefore, the overall maximum for the laboratory work is 100 points as for every works.

How to pass the work

Both the preliminary questions and the report must be returned. The required minimum for the preliminary questions is 15 points and 25 points for the report. If this is not the case, one has to retake the work (or just the preliminary questions or the report).

Hardware

The hardware used in this work is the same as one in laboratory work 1 i.e. 800 MHz PC with additional equipment and accessories.