

Laboratory work 3 STUDYING OF PULSES AND RANDOM SIGNALS

Preliminary questions

Return the answers to the preliminary questions for the assistant in the beginning of the laboratory work. **Before returning take a copy of them for yourselves.**

1. What is meant by the following terms when talking about (voltage) signals?

Mean value Standard deviation Variance Autocorrelation Power spectrum

2. Consider a signal $x(t) = 2 V \cos(2\pi f_1 t) + 3 V \sin(2\pi f_2 t)$, where $V = \text{volt}$, $f_1 = 1200 \text{ Hz}$ and $f_2 = 1500 \text{ Hz}$. The signal is fed into a nonlinear system. The output signal of the system is $y(t) = x(t) + 0,1x^2(t)$. Which frequencies does $y(t)$ consist of? Make a table of the frequencies and the corresponding amplitudes in volts and dBV's. Write down the used equations and formulas, too!

3. Sketch the convolution of the signal $x(t)$ and the impulse response $h(t)$ shown below. Signal $x(t)$ is an equal-sided triangle which duration is 2 s and maximum value 3 V. Impulse response $h(t)$ is a rectangle which duration is 4 s and maximum value 2. Write down the used equations and formulas, too!

