

THERMOMECHANICAL MEASUREMENTS FOR ENERGY SYSTEMS

MENR (A. A. 2017-2018)

Laboratory n. 2

A measurement chain is made of the following tools: a passive RC filter network, a signal generator, a digital oscilloscope, red and black connecting wires.

Connect the wires in a way to realize a Low Pass Filter. Apply an AC voltage to the RC filter input to study the output response.

Connect the wires in a way to realize a High Pass Filter. Apply an AC voltage to the CR circuit input to study the output response.

Display the waveforms on the oscilloscope. Choose the correct oscilloscope settings and study the basic characteristics of the signal.

1. Using two oscilloscope channels, define experimentally the cut-off frequency of both filters, $f_c = \frac{1}{2\pi RC}$ and check the consistency between them.
2. Estimate the accuracy of the experimental detection and compare the result with the theoretical value (resulting from the measurement of R and C values).
3. Using as input to the circuit a square wave, show for which frequencies the filter acts satisfactorily as an integrator circuit. Give also a quantitative evaluation of the deviation of the satisfactory waveform from the theoretical integral.
4. Using as input to the circuit a triangular wave, show for which frequencies the filter acts satisfactorily as a derivative circuit. Give also a quantitative evaluation of the deviation of the satisfactory waveform from the theoretical derivative.

Circuit diagrams:

