

Synchronous measurement of low-level high-frequency current using a current transformer.

The subject of the thesis is the contactless measurement of small high-frequency currents, in particular, the sensitivity and accuracy of such measurements in synchronous measuring mode using a current transformer. The expected frequency range is between 10 kHz and 5 MHz, and the current range is from 10 nA to 10 mA. Voltage source and series precision resistors generate the measured current with resistances in the range from 100 Ohm to 100 kOhm. The influence of the measurements on the current to be measured should be minimal.

The Master's thesis shall follow the general rules established by Tallinn Technical University and include, among others, the following parts:

1. Overview of main known contactless current measurement solutions in a predetermined range of frequencies and currents, comparison of their sensitivity, accuracy, and resolution.
2. The results of practical measurements in a synchronous measurement mode using a common current transformer solution with subsequent voltage amplifier.
3. The results of practical measurements in a synchronous measurement mode using the advanced solution with a current transformer and subsequent voltage amplifier. The advanced solution will be provided by the supervisor, but the student's good new ideas for improvement of the sensitivity and accuracy are very welcome.
4. Comparative analysis of measurement results and a summary of the work. Recommendations for further research.