

The Effect of Unipolar Pulses on Static Energy Meters

Bachelor thesis project

Summary:

The effect of bipolar pulses on static energy meters (SM) utilizing Rogowski coils has been clearly described, showing why and how such pulses cause misreading on SM measurements [1]. Following the same theory unipolar pulses seem to create smaller errors, even though energy measurements show errors in the same order of magnitude.

Problem definition:

A clear description and explanation has not yet been given on the effect that unipolar pulsed currents have on the energy measurements of SM.

Method:

A measurement setup exists at the University of Twente with 24 static energy meter and reference meters. Furthermore, an AC controlled current-load has been built to draw arbitrary current waveforms to investigate the SMs. An overview of the measurement technique inside the SM could be recreated in simulation software, such as Simulink. The work will be a combination of measurements in the lab, together with simulations.

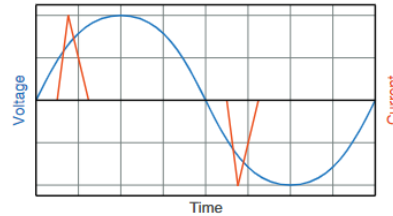
Research objectives:

A proper and full description of the effects of unipolar pulses on SM errors could be the result of the assignment. In this assignment the combination of the theoretical mathematical expectation, simulations and measurements could be combined into a full story.

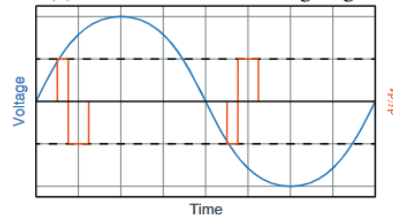
Courses and supervision:

No specific courses are needed as a background. A good affinity with Matlab, Simulink and Mathematics is very beneficial for doing this assignment.

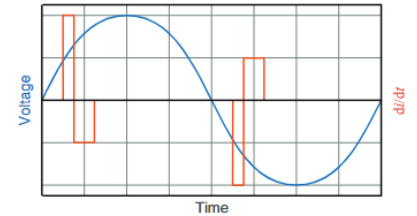
[1] T. Hartman, B. ten Have, J. Dijkstra, R. Grootjans, N. Moonen, and F. Leferink, "Susceptibility of Static Energy Meters Due to Amplifier Clipping Caused by a Rogowski Coil", IEEE Transactions on Electromagnetic Compatibility.



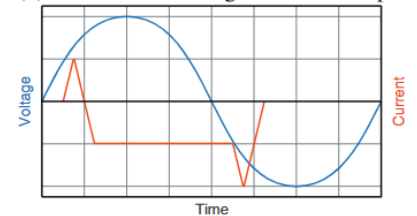
(a) Pulse with a fast rising edge



(c) Clipped amplifier output



(b) Differentiated Rogowski coil output



(d) Distorted current after integration

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