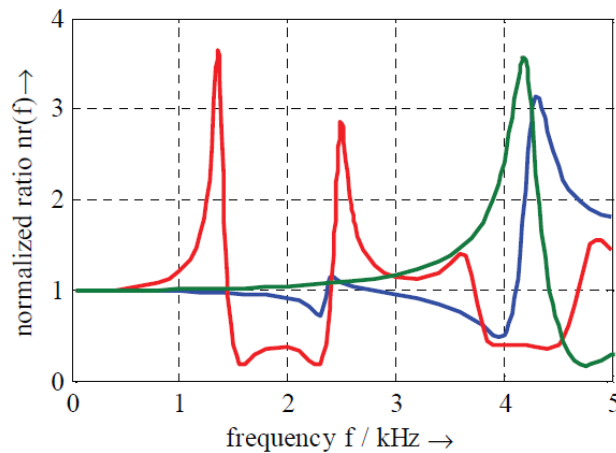# Tuning Voltage Transformers for HV Power Quality measurement

Bachelor thesis project

*Normalized transformer ratio nr(f) for 66-kV-VT (green),
110-kV-combined transformer (blue) and 220-kV-VT (red)*

Tuning 110 kV voltage transformer for PQ-measurement

Summary:
Improve the frequency behaviour of 110 / 150 kV transformers such that they can be used for measurement of harmonics in the electricity grid.

Problem definition:
Conventional high-voltage transformers (HV VTs) are not suited for the measurement of harmonics in the electricity grid (up to 25th harmonic) due to internal resonances (see as an example picture above). The question is to what extent this non-ideal wideband behaviour of HV VTs can be compensated for by connecting a special burden to the output of the VT.

Method:
- Literature study on the limitations of wideband voltage measurements using conventional HV VTs
- Evaluation of existing solutions to (partially) compensate for non-ideal HV VT behaviour
- Develop a wideband model for 110/ 150 kV VTs, and based on this model design a special burden that can be connected to the ouput of the VT to improve its wideband behaviour.
- (MSc:) Test the simulation on a real VT with a to be adapted burden with an arbitrary wave shape generator, developed at TU Delft.

The work will be performed in close collaboration with TenneT, the Transmission System Operator of the Netherlands, and the HV testing (MSc project) will be done at the HV group of the TU Delft.

Research objectives:
Feasibility report that describes to what extent non-ideal frequency behaviour of 110 / 150 kV VTs can be improved by a specially-designed burden connected to its output.

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Courses and supervision:

No specific courses are need as background for this thesis project. Good affinity with electrical circuit modelling is very beneficial for doing this assignment, as well as an interest in (HV) measurement techniques.

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