Determination of Impulse Generator Parameters for Transient Testing of Transformers

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Impulse test is one of the key and compulsory routine tests which is performed on large power transformers before they are put into service. It is designed to mimic a lightning strike or a switching impulse in service. In order to reflect this effect, some standards organizations have come up with a standard voltage waveform to be applied to the various transformer terminals. More specifically, the standards often specify a 1.2/50 waveform for lightning impulses and 250/2500 waveform for switching impulses.

To generate those particular waveforms as it is during an impulse test is quite challenging, particularly the full-wave one, and a try-and-error approach is often taken. This usually requires experience with previous impulse tests on similar type transformers too. There are even cases where it does not seem possible to achieve the desired waveform by altering the generator parameters. This is usually a matter of the tail dropping too quickly so that 50% of the peak voltage value is reached at times before 50 μs. In such cases, it is sometimes permissible to add a grounding resistor to one of the windings to help boost the tail. In these cases, it would be helpful to know in advance that the proper waveform cannot be achieved by changing the generator parameters alone before efforts are made on this process.

To overcome these issues, it is useful to have a detailed circuit model for the transformer. In this project, we develop a model for the transformer based on frequency response measurements. In this process, we have consider the transformer as a two port network and develop the admittance matrix. With the aid of this admittance matrix, we model the fully detailed transformer circuit. Since we develop this model using measured frequency response of the transformer, the model is accurate for the frequency range of interest.

In this research, we expect to outline a method to obtaining a set of parameters for impulse generator, and we hope to implement and compare with the ideal waveform. This method requires a suitable optimization technique to find the most accurate settings which reflect the ideal waveform.

REFERENCES
