

Critical thinking on engineering

Technology, Development



The evaluation of Current Transformer models was carried out using EMTP (Electro Magnetic Transient Program). As a matter of fact, relaying CTs with 2000/5 and 600/5 ratios were used to undertake the experiment in order to determine the response of the transient. There are WMTP nonlinear reactor and saturable transformers models that are very useful in the simulation of Current Transformers and its response. The transient response needs to be experimented using CTs in a laboratory and as well be compared with digital simulation. It is crucial to comprehend various approaches of model implementation Perhaps, in the process of model implementation voltage input is obtained from a capacitor voltage transformer or potential transformers. On the other hand, current input for various protective relaying is perhaps obtained from current transformers.

In the experiment, the Current transformers (CTs) presented are built for the bushing CTs type. The data from the CT used can be measured easily, and at the same time it can be available from the manufacturers, these include secondary winding resistance, as well as V-I characteristics. In the EMTP, there is a single phase power transformer model with tremendous saturation. This type of model consists of an equivalent circuit that is built all around ideal transformer. In this phase, the branch that entails magnetization is internally presented as one of the nonlinear inductor. The CT modeling can also be carried out using Type-98 model that is available in EMTP so as to gather the saturable transformer. In addition, the Type-98 model of a nonlinear inductor can be connected to the simplified transformer at the secondary terminal.

In most cases, the saturation effects in the experiment are modeled using

Type-98 (single valued nonlinear inductor model) of EMTP. Certainly, this type of transformer model does not explain hysteresis consequences in the transformer core. Hysteresis effect requires a different component of EMTP to model it; this component is known as Type-96. In the experiment, it is evident that the EMTP existing models for nonlinear inductor Type-98 and single phase power transformer can be utilized in the development of Current Transformers models. In addition, the CT models based on EMTP are a tremendous way to replicate faults transient for a study of the relay. This is because it is easy to connect a model of EMTP of a power network.

The differences between some waveforms obtained by simulation and tests are as a result of using Type-96 and Type-98 elements. These sorts of differences require tremendous and further research to comprehend the variation between waveforms that are obtained. The Current transformers based on EMTP that use Type 98 are very sensitive to changes in V-I curve. In some occasions, the slope is very high in the saturated region; in such a scenario the simulation outcome does not represent Current Transformers transient behavior. Based on the experiment, it is clear that Type 96 that include remanence and hysteresis can be used to develop CT models, especially if the phenomena are relevant. It is asserted that the saturation point can tremendously influence the hysteresis results that are generated by transient simulation and EMTP. Evidently, the performance of CT is mostly understood, but what is difficult to comprehend is the transient performance. Hence, it is crucial to carry out numerous studies on CT transient behavior in order to comprehend its effects and operation. The outcome of the research failed to indicate how the development of the digital Current Transformer

model is carried out. In general perspective, EMTP approach pertaining CT model appears to be the ideal choice.