CHAPTER 5

CONCLUSION AND FUTURE WORK

5.1 Conclusion

1. The paper has described a more complete basic theoretical equation for the transient over dimensioning factor than normally has been published, or been used for specifying of CT requirements, and co-ordination of relays and CTs. The described equation takes into consideration the effect on the K_{TF} factor for different degree of DC in the fault current. Modern numerical protective relays often require only a very short time to saturation. If the required time to saturation is less than 4ms the K_{TF} factor should be calculated according to the more complete equation. For this short time to saturation it is also important to consider less degree of DC in the fault current. The dimensioning of the CTs will be more correct and the over dimensioning will decrease.

2. The process of CTs saturation can be understood using the volt time concept. The concept defines a threshold of saturation using an idealized B-H curve and establishes the relation of the accuracy class voltage to the saturation flux as shown in Fig.3.8 Typical Magnetizing characteristic

3. A CT excitation curve provides a measure of the steady-state performance. Excitation curve have a knee-point voltage defined by the 45° line drawn tangent to the curve. However, it is important to note that the knee-point is the point of maximum permeability and not the point of saturation.

4. The saturation point of a CT is defined as the excitation voltage at 10 amperes of excitation current which produces no more than a 10% ratio correction at 20 rated times current using a standard burden. The 10% error defines the threshold of significant wave distortion due to saturation.

5. CT models were discussed to show how computer simulation can be used to verify the CTs calculation performance for requirement of CTs which are applied using the equation i.e. Knee point voltage and ALF factors. The computer runs for both transformer and generator differential relay applications were shown. Both examples show the limit of transient operating current due to dc saturation that can be tolerated for a through fault condition.

6. The knee point voltage must be higher than the stabilization voltage for external faults.

7. The smaller the CT burden in Volt-amperes, the better (higher) the actual accuracy limit factor.

8. The interposing CT could therefore be positioned between the high voltage CTs and the relay or low voltage CTs and the relay, as the relay nominal current, the second alternative is chosen.

9. The CT accuracy primary limit current defines the highest fault current magnitude at which the CT will meet the specified accuracy.

10. The actual accuracy limit factor differs from the rated accuracy limit factor and is proportional to the ratio pf which is the rated CT burden and the actual CT burden.

5.2 Future Works

There are few factor can be updated, a more complete basic theoretical equation for the Transient Overdimensioning factor can be created and the curve have plotted, or been used for any specifying of CT requirements, and co-ordination of relays and CTs. The more described equation can be added up in different function equation for example to calculate the harmonic of the curve and add the inductance equation through Matlab program. Time to saturation can be describing more through Ktf factor should be calculated according to the more complete equation.