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Literature survey on the elimination of effect on power transformers by using differential protection

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ABSTRACT

The word "Elimination" is generally used to describe the whole concept of removing or controlling the errors value to the stationary value of power system. In this paper an effort is made in the direction of development in the protection of power transformer. Protection of all types of transformer in the power system is very important for normal operation of power system. Among the various operation of power transformer differential operation is very common method. In this paper we review the concept of power transformer differential protection then analyse the problem of transformer differential protection to find the solution. We then analysed the different types of fault for study.

Keywords: Differential Protection, Fault Current, Power Transformer.

1. INTRODUCTION

The power system development is nothing but the development of the all power system devices such as transformers including all sizes, transmission lines, sub transmission lines, distribution lines, sub distribution lines, all types of generators, as well as all protecting devices. In modern power system the power transformer is one of the very important devices. Protection of power transformer is quite critical as compared to other transformers. Due to this big deal, area of protection of power transformer is going to be very important for researchers. For the protection of power transformer differential protection algorithm method of transformer protection is one of the effective methods. There is various parts that has been assembled in the power transformer which costs more so for these reason we have to protect all these parts in abnormal condition.

2. LITERATURE SURVEY

Power transformer is main equipment in substation and power station. Power transformer performs very important role in power system network. It provides expected power supply to consumers. Power transformers are designed to operate with normal sinusoidal input voltage. Differential protection is main protection used for protecting power transformers. Transformer differential protection schemes are ubiquitous to almost any power system. Differential protection method is typically, transformer protection included minimisation of internal fault occurs due to magnetising inrush current in power transformer and overcoming the CT's related issue as well as over excitation condition. There are three attributes for detection of fault that are

1. Increasing in differential current .
2. Increase in phase current
3. Gas formation due to the arc.

While the basic premise of transformer differential protection is straightforward, numerous features are employed to compensate for challenges presented by the transformer application. Challenges to Understanding Transformer Differential Protection

1. Current Mismatch Caused by the Transformation Ratio and Differing CT Ratios
2. Zero Sequence Elimination
3. Over Excitation Phenomena

Differential protection method is generally used for the protection of transformers, generators, large motors and buses. For every device separate specialised relay is used. For power transformer generally differential relay is used. One of the adequate method

for protection of power transformer is the differential protection method by using differential relay circuit. This scheme is based on the fact that power input to the transformer is equal to power output under normal condition. If the connections of secondary side of transformer are proper under normal condition then there is no current will flow into the relay coil that is differential current is equal to zero. Whenever there is fault occur throughout protective zone, the current imbalance will exist which leads to closing in relay contacts and releases a trip signal to activate circuit breaker for the purpose of disconnection of faulty section i.e. transformer from the grid.

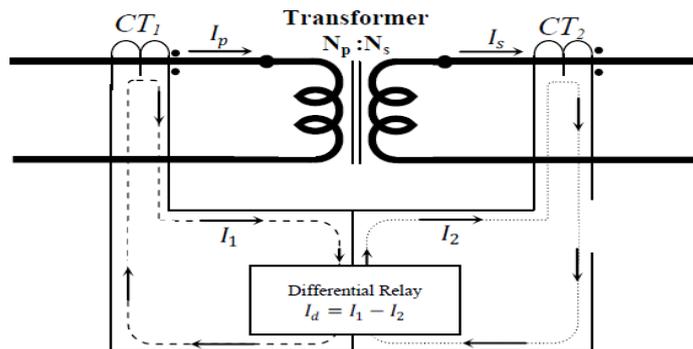


Fig. 1: Differential protection of transformer

In power transformer protection scheme differential relay should avoid and block the tripping of differential relay in the course of magnetizing, inrush and over excitation as well as fast tripping during the fault. So it is going to be very important to opt for conquered catalogue scheme which can precise between magnetizing inrush, over excitation and internal fault current.

Guzman [1] has given in his paper a new method to distinguish inrush fault current due to internal fault current by the sum of active power from each terminal flowing into the transformer. In power transformer generally second harmonic component is adopted to avoid blocking in differential relay, for elimination of unnecessary trip by magnetizing current.

Hayward [2] presented in his paper harmonic restraint by using new type of relay which is able to distinguish between the internal fault current and magnetizing inrush current by their different waveform shape. In this method mechanical parts are present and contain quite complicated circuit.

Sachdev, sidhu and wood [3] has given new algorithm to detect winding fault in single phase and three phase transformer. To test algorithm different types of winding condition were simulated on computer. By using this algorithm it is possible to measure winding current.

Pyone Pyone Aye [4] presented modelling and simulation of differential protection for power transformer at primary substation. The complete differential relay design model is presented in this paper. The detailed studied is carried out at 230/33 /11kV Thanlyin Primary transmission substation.

3. CONCLUSION

This paper represents the basic, advanced level information and provides an overview of the different type and schemes of the transformer protection. This paper contributes to different advanced and traditional based protective relay used for the transformer. There are many issues are occurred in the transformer, so to protect transformer proper protective gear arrangement is required. This paper can be useful for those who are wishing to carry out research in the direction of power transformer as well as differential protection scheme. This survey can be helpful to know which and how various schemes are being used for applying differential protection for power transformer.

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