

STUDY OF STATE SPACE MODEL OF TRANSFORMER FOR RELIABILITY OF POWER

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Abstract:- In this paper the reliability model of the power transformer is obtained. The transformer is dividing into different part. We make state space model of each equipment of power transformer. The state space model of different component either divide into three states and two state space models. Combining three states & two state model of power transformer component five state model of power transformer is obtained. The proposed state space model contains five states. With the help of proposed five state space model evaluate the reliability of power transformer with the help of reliability data of power transformer.

1. INTRODUCTION

In electrical power network, transformer is one of the most important electrical equipment in power system, which running status is directly concerned with the reliability of power system. Therefore research on the reliability of the transformer has become an imported research topic Transformer is required throughout modern interconnected power systems. The size of these transformer ranges from as low as few KVA to over a few hundred MVA, power transformer are usually very reliable, with a 20-25 year design life. In practical, the life of a transformer can be as long as 60 years with appropriate maintenance. With appropriate maintenance the life of a transformer can be as long as 60 years.

Transformers have sufficient electrical and mechanical strength to withstand unusual system disturbance such as short circuit faults or over voltages. As transformers age, their internal condition degrades increasing the risk of failure. The System abnormalities, loading switching and ambient conditions contribute to accelerated aging and the sudden failure of transformers. Transformers are costly to repair or replace and failure may result in a significant loss of revenue there for their proper function are vital for the substation and utilities. Therefore reliability model of power transformer is very imported in risk assessment of engineering systems.

Object of paper:-

1. To make state space model of power transformer component.
2. To develop state space model of power transformer.
3. To evaluate the reliability of power transformer with the help of state space method.

2. TRANSFORMER

Power transformer consists of different parts [13]. Core and winding are two main component of the transformer, belonging to the part known as the active part of the transformer. The winding are has the role of carry magnetic flux. The winding are arranged as cylindrical shells around the core, each one is covered with insulation paper the function of the winding is the winding is to carry current. Active part of the transformer is contained inside the tank which physically protects it. The tank is also the container of the oil. On load tap- changer (OLTC), by adding or subtracting turns of the windings, regulated the voltage level of the transformer.

Bushing is one of the important component of the transformer connect the winding the windings and the power system. Cooling system is used to cool the active part of the transformer. Power transformer utilizes different class of cooling systems. State space method is a evaluate reliability and safety of the complex. Analysis the transformer and compose a state space model of transformer of different component these



are winding, tank, bushing, cellulose isolation and cooler and oil insulation see in figure 1. Fault tree of transformer and

short explanation for them are presented below.

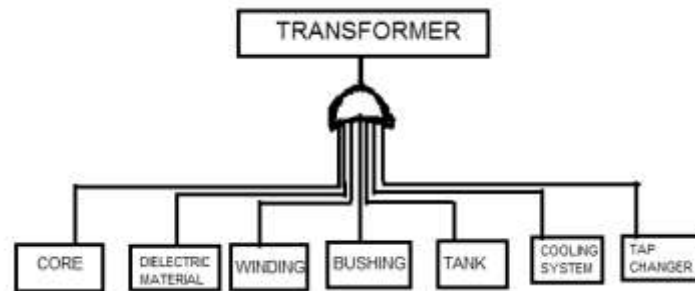


Figure. 1 Transformer Tree



Figure. 2 Power Transformer

3. RESULT

In figure with the help of five state space model of power transformer state probability equation is generated.

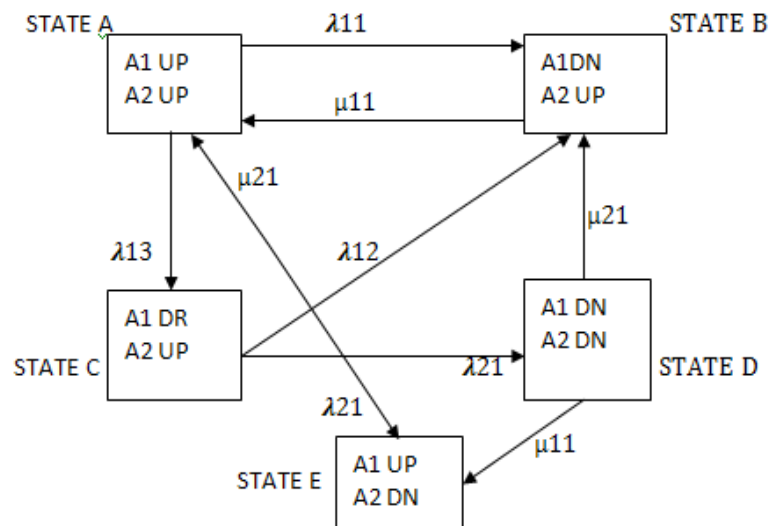


Figure. 3 Five State Model of Power Transformer

Table 1. Result- Probability of Transformer

Probability	Value (%)
P1	0.9444
P2	8.5952e-005
P3	1.3666e-006

Table 2. Result – Probability of transformer

Probability	Value (%)
P1	0.9444
P2	8.5952e-005
P3	1.3666e-006

4. CONCLUSION

In electrical power network, transformer is an integral part of power systems and their reliable operation directly impacts that of the whole network. Reliability of a power system is considerably influenced by its equipments. Power transformers are one of the most critical and expensive equipments of a power system and their proper functions are vital for the substations and utilities. Therefore, reliability model of power transformer is very important in the risk assessment of the engineering systems. In this research we find out the reliability of power transformer with the help of state space method.

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