

Power Transformer Protective System Reliability Assessment

A. Abdelmoumene¹⁾, H. Bentarzi¹⁾, and I. Ouahdi²⁾

¹⁾Signals and Systems Laboratory, IGEE, Boumerdes University, Algeria,
sisylab@yahoo.com

²⁾Department Electrification et Automatisation, FHC, Boumerdes University, Algeria

Keywords: *Power transformer protection, Reliability Evaluation, Redundancy, Fault tree.*

Abstract

The safety of the power systems is mainly related to the power transformers. Many precautions have been taken for protecting these transformers from defects because when they break down they often cause large fires and explosions, and hence the consequences can be very heavy in terms of damage as well as in terms of economic loss.

A great number of experts have noticed that an important increase in transformers failures during the last years. In the majority of the countries, the privatization of companies of production and distribution of electricity gives place to a reduction of investments. Moreover, the consumption of electricity increases regularly by 2% per year around the world. The old transformers are therefore often overloaded. Moreover, published statistics on failures, fires and explosions of these large power transformers show that these types of incidents frequently appear, so that power companies should pay a special attention to the effectiveness and the reliability of the protective systems.

In this work, a new approach allowing an evaluation of the reliability of the protective systems of power transformer with and without redundancy has been presented. The first part of the paper is devoted with the presentation of the various defects undergone by the transformers and their adequate protection techniques, see Abdelmoumene (2009). Then, models using the fault tree, see Chafai, M., Refoufi, L. and Bentarzi, H. (2009), have been developed for both protective systems: without redundancy and with redundancy. A comparative study shows that the reliability of the protective system with redundancy is increased several times as compared to its reliability without redundancy.

References

- Abdelmoumene, *Etude de la redondance sur le système de protection du transformateur de puissance*, Magistère thesis, Boumerdes University, Algeria, 2009.
- Chafai, M., Refoufi, L. and Bentarzi, H. Reliability Assessment and Improvement of Medium Power Induction Motor Winding Insulation Protection System Using Predictive Analysis, in *Advances in Numerical Methods*, Book-Chapter Verlag-Springer, Berlin Heidelberg, 367-378, 2009.