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Comparison of Electrical Parameters of Oil-Immersed and Dry-Type Transformer Using Finite Element Method

Authors : U. Amin, A. Talib, S. A. Qureshi, M. J. Hossain, G. Ahmad

Abstract : The choice evaluation between oil-immersed and dry-type transformers is often controlled by cost, location, and application. This paper compares the electrical performance of liquid- filled and dry-type transformers, which will assist the customer to choose the right and efficient ones for particular applications. An accurate assessment of the time-average flux density, electric field intensity and voltage distribution in an oil-insulated and a dry-type transformer have been computed and investigated. The detailed transformer modeling and analysis has been carried out to determine electrical parameter distributions. The models of oil-immersed and dry-type transformers are developed and solved by using the finite element method (FEM) to compare the electrical parameters. The effects of non-uniform and non-coherent voltage gradient, flux density and electric field distribution on the power losses and insulation properties of transformers are studied in detail. The results show that, for the same voltage and kilo-volt-ampere (kVA) rating, oil-immersed transformers have better insulation properties and less hysteresis losses than the dry-type.

Keywords : finite element method, flux density, transformer, voltage gradient
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