

# A Fuzzy Logic Proposal for Diagnosis Multiple Incipient Faults in a Power Transformer

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## Abstract

For the safety and continuity of service in industrial electrical systems, the availability of transformers is essential. For this reason, it is necessary to develop intelligent fault diagnosis techniques to reduce repair and maintenance costs. Recently, several methods have been developed that use artificial intelligence techniques such as neural networks, support vector machines, hybrid techniques, etc., for the diagnosis of faults in power transformers using gas analysis. These methods, although they present very good results, encounter restrictions to determine the precise moment before the occurrence of multiple fault of small magnitude and are difficult to implement in practice. This document proposes a method to diagnose multiple incipient faults in a power transformer using fuzzy logic. The proposal, based on historical data from the composition of the gases dissolved in the oil, achieves a performance in the classification of multiple incipient fault of 98.3%. With reliable samples of dissolved gas, it guarantees an overall rate of accuracy in detecting incipient faults that is superior to that obtained by the most successful conventional methods in the industry. The proposal does not encounter generalization difficulties and constitutes a simple solution that allows determining the state of the transformer in service without affecting the continuity of the electricity supply.

## Keywords

Power Transformer, Fault diagnosis, Fuzzy logic, Dissolved gas analysis