A multi-criteria computer package for power transformer fault detection and diagnosis

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Abstract

A package in Maple that helps users in power transformers fault detection and diagnosis has been developed. Transformers are required throughout modern interconnected power systems. Their range comprises from a few kVA to over a few hundred MVA, both in low voltage and in high voltage electrical network. As they are considered the key element in such systems, several maintenance methods have been reported in the literature: dissolved gas analysis (DGA) technique, short-circuit impedance (SCI) measurement, frequency response analysis (FRA) and power factor testing among others. All of them have as main goal to increase its useful life; normally reduced from aging process, stress conditions or electrical faults. Besides, they require special measurement devices and the experience of engineers, in order to make a proper diagnosis. This paper firstly determines the requirements of these tests to be applied and coordinate their input data and their output (diagnoses and recommendations). Afterwards, the package developed, that guides the users throughout the diagnosis processes, automatizes data processing and returns of the different tests (underlining if any contradiction between them arises) is summarized. The method is extensible/scalable by means of adding new techniques on this field of application.

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1. Introduction

A package in Maple that helps users in power transformers fault detection and diagnosis has been developed. Maintenance activities are critical for assuring the reliability and extending the useful life of any industrial equipment as well as reducing the associated further costs. It is well known that traditional maintenance operation strategies can be basically listed into three classes:

- Corrective maintenance: actions and repairs are carried out just after a breakdown of equipment [1].
- Preventive maintenance, time-scheduled maintenance or routine time-based: maintenance operations are performed for a preset period. It conducts routine inspections and tests so that impending troubles can be detected and reduced or eliminated [2].

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