FUZZY LOGIC APPLICATION IN DGA METHODS TO CLASSIFY TYPE OF FAULTS IN OIL TRANSFORMER

Thesis is presented in partial fulfilment for the award of the
Bachelor of Electrical Engineering (Hons)
UNIVERSITI TEKNOLOGI MARA

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MAY 2010

ACKNOWLEDGEMENT

Alhamdulillah, thanks to mighty Allah S. W. T., for giving me patience, strength and blessing me throughout completing this project thesis. Nothing can be done without His permission.

I would like to express my deep gratitude to my supervisor, Assoc. Prof. Dr. Ismail Musirin for all his constant guidance, patience, support and motivation which have helped me to successfully complete this project and thesis. I am truly honoured and humble to have him as my supervisor because his knowledge and expertise is very wide. Without his assistance, this project could hardly be finished.

I would also like to thank to my parents and friends for their constant support. Lastly, thanks for support and contribution of all persons who directly or indirectly contributed towards the successful completion of this project thesis.

Thank you so much.

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ABSTRACT

Assessment of power transformer conditions is increasing concern in latest years. Failure of transformer can cause high installation cost and utility will lost. Dissolved gas-in-oil analysis (DGA) is successful technique and provided wealth of diagnosis information to detect incipient faults in oil transformer. The fault gases that considered for evaluation are hydrogen, methane, ethane, ethylene and acetylene. There are various methods developed to do the inspection of the fault type from the DGA data but only two methods are used in this study which is Roger's Ratio and IEC Ratio. However, there are situations of errors and misleading results occurring due to borderline and multiple faults. This is because the relation between different gases become too complete and cannot match with the actual fault. In order to solve the problem, this study proposes Fuzzy Logic to efficiently classify fault type in oil transformer based on its higher reliability and precision of fault diagnostics. Fuzzy Logic engine is developed using MATLAB to evaluate each DGA method.

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CHAPTER 1

INTRODUCTION

1.1 OVERVIEW

Power transformers are the most critical and expensive equipments in electrical power systems and their failure can cause interruptions in the supply to electrical installations. Large transformer failures are often catastrophic and generate irreversible damage [1]. The failure statistic of power transformer was studied by Thanapong Suwanasri and *et.al* [13] by considering the scattering history data of power transformer. The results from failure statistic analysis reveal that bushing an on-load tap changer have the highest minor failures due to leakage and defect respectively.

If an incipient failure is early recognized, the power transformer can be either repaired or replaced before it causes a fault, in a scheduled maintenance program. Increasing concern in assessment of power transformer conditions to diagnose incipient faults will reduce the danger to the installation and minimize the overall cost.

Mineral oil performs two important functions in transformers. It cools the transformers and provides electrical insulation. Mineral oil is basically a mix of hydrocarbon components. Faults in oil transformer occur when mineral oil is subjected to high thermal and electrical stresses then produce the energy that is needed for breaking the chemical bonds between the atoms that make up the hydrocarbon molecules. As a result, gas in various concentrations may be