# SIMULATION OF DISSIPATION FACTOR (TAN δ) AND ITS CORRELATION TO VARIED FREQUENCY VALUES IN TRANSFORMER INSULATING OIL

This thesis is presented in partial fulfillment for the requirement of the Bachelor Of Electrical Engineering (Honours) (Power)

**FACULTY OF ELECTRICAL ENGINEERING**

**UNIVERSITI TEKNOLOGI MARA**

**MALAYSIA**


**RAFEAH BINTI RAMLAN**
**Faculty of Electrical Engineering**
**UNIVERSITI TEKNOLOGI MARA**
**40450 Shah Alam**
**Selangor Darul Ehsan**

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# ABSTRACT

Dissipation factor (Tan δ) is one of the characteristics used to determine the insulation performance. Previously, measurement of the dissipation factor over frequency has not much been done to assess the condition of insulation. This project focused on finding the relationship of varied frequency to the value of tan δ of transformer insulating material and its winding. A circuit model, which describes the behaviour of the transformer's insulation system, has been drawn into MATLAB software and simulated by varying the components. A better analysis and understanding of the results is only possible with a clear understanding of the insulation system in response to frequency by using Schering Bridge. This paper then present discussions and it was found that tan δ decreases with the increased frequency value.



*Index terms*---- Dissipation Factor, Tan δ, Schering Bridge, Transformer, Frequency

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**CHAPTER 1**

**INTRODUCTION**

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# CHAPTER 1

# INTRODUCTION

## 1.1 BACKGROUND OF STUDY

Non-destructive electrical tests are usually carried out on the equipment insulating materials to ensure that its electrical characteristics comply with the specification without destroying the insulation. Insulating materials exist in a variety of different forms, including gas, liquid, solid, and vacuum. As the result, there are significantly different dielectric strengths and insulating properties for different forms of insulating materials. Amongst non-destructive test used are Polarization Index, Insulation Resistance, Dielectric Spectroscopy measurement, Tangent Delta/Dissipation measurement, Partial Discharge and etc. In most cases, the non-destructive testing is also referred as diagnostic testing where result interpretation is required. In practical this testing method is widely used for condition monitoring activity while trending of the test results will be monitored closely thus the more information are obtained compared to spot test reading.

## 1.2 PROBLEM STATEMENT

Previously, the diagnostic of insulation condition through the use of tan δ was carried out by varying temperature or voltage levels. Although these methods show good relationships in determining insulation strength and properties, there was not so much of research conducted in determining the correlation between varying frequency condition with the tan δ.