

EFFECTS OF VARIABLE APPLIED VOLTAGE AMPLITUDE TOWARDS
PARTIAL DISCHARGE IN SOLID INSULATION

BAZLY B. AHMAD MUSTAFA HADI

A report submitted in partial fulfillment of the
requirements for the award of the degree of
Bachelor of Engineering (Electrical)

Faculty of Electrical Engineering
Universiti Teknologi MARA

JULY 2012

ACKNOWLEDGEMENT

Praise to Allah S.W.T., the Most Almighty and the Most Merciful. Peace be upon him, Muhammad, the messenger of God.

First and foremost, my deepest and heartily gratitude goes to my supervisor, Mrs. Aida Sulinda Bt Kusim for her guidance, morale support and insightful comment to this project.

My appreciation also goes to my family who has been so patient and supports me all these years. Thanks for their encouragement, love and emotional support that they had given to me.

I would also like to thank all the lecturers from Electrical Engineering faculty for their support and involvement, whether direct or indirectly participation in ensuring the smooth progress of my project.

Not to forget, my great appreciation dedicated to my friends, Fikri, Audi, Akmal, Faizal, Fitri, Imran and Khairil and the entire students of EE221 2009 – 2012 batch for their love, support and concern.

ABSTRACT

Partial discharge plays an important role in the aging of solid insulation system. Over the past decade, partial discharge has become an interesting topic for researchers due to its complexity. Even today, a precise documentation of partial discharge is still not achievable because researchers have found new evidence of factors contributing to partial discharge occurrence. In this paper, a generalized approach of investigating the effects of variable applied voltage amplitude towards partial discharge is discussed. Partial discharge activity of a single cylindrical void, inside a solid insulator is simulated using SIMULINK. The solid insulator sample used was epoxy resin. Parameters such as voltage discharge of sampling resistance and current discharge of void are studied in order to understand the relationship between the amplitudes of applied voltage and partial discharge. From the results achieved by simulation, it was found that partial discharge pulses increases linearly with the increase of applied voltage. This shows that partial discharge occurrences are dependant of the amplitude of the applied voltage. Even though the result might be different from real model of PD, but theoretically the simulation manage to verify that voltage stress affects the value of PD in a solid insulation material.

TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	DECLARATION OF THESIS	ii
	DEDICATION	iii
	ACKNOWLEDGEMENT	iv
	ABSTRACT	v
	ABSTRAK	vi
	TABLE OF CONTENTS	vii
	LIST OF TABLES	x
	LIST OF FIGURES	xi
	LIST OF SYMBOLS	xiii
	LIST OF APPENDICES	xv
1	INTRODUCTION	
	1.1 Overview	1
	1.2 Problem Statement	2
	1.3 Objective	3
	1.4 Scope of Work	3
	1.5 Thesis Outline	4
2	LITERATURE REVIEW	
	2.1 Introduction	6
	2.2 Partial Discharge Phenomena	6
	2.2.1 Partial Discharge Definition	7
	2.2.2 Partial Discharge Inception Voltage	7

CHAPTER 1

INTRODUCTION

1.1 Overview

Partial discharge (PD) is occasionally associated with the degradation of power apparatus insulation system. In term of definition, PD is a localized electrical discharge that happens across a portion of the insulation without fully bridging the electrode [1]. Factors that contribute for the occurrence of PD that have been known include voids, cracks, air bubbles and other types of impurities [2].

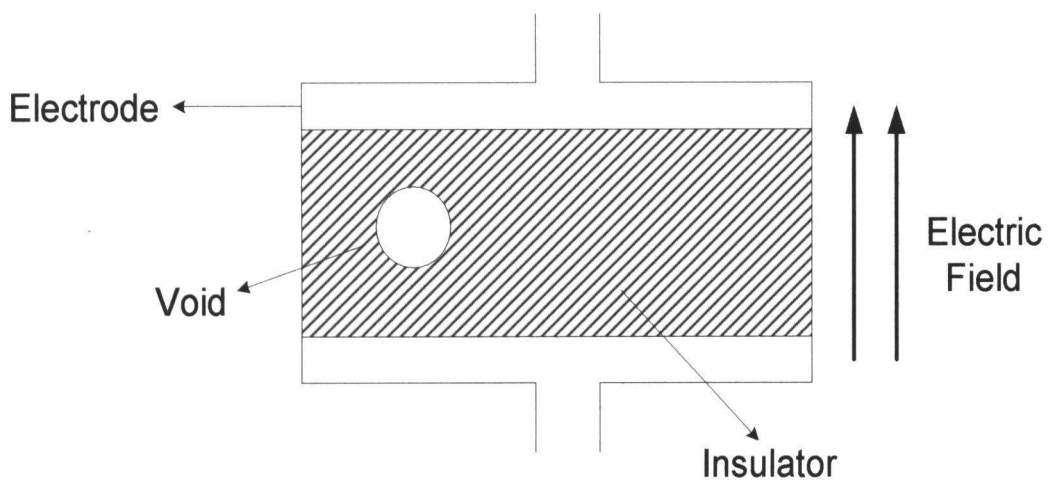


Figure 1.1 : A physical representation of a void in a solid insulation medium