IDENTIFICATION OF CABLES INSULATOR DEGRADATION USING PARTIAL DISCHARGE AND FUZZY LOGIC TECNIQUE

This project report is presented in partial fulfillment for the award of Bachelor of Electrical Engineering (Hons)

UNIVERSITI TEKNOLOGI MARA

AHMAD SYAHRIL BIN MOHD NAWAWI
Faculty of Electrical Engineering
Universiti Teknologi MARA
40450 Shah Alam
Selangor Darul Ehsan

OCTOBER 2004

ACKNOWLEDGEMENT

All praise be to Mighty Allah S.W.T, the Merciful and benefit for the strength and blessing me throughout the entire research and completion of this thesis. Peace upon our prophet Muhammad S.A.W, whose have given light to mankind.

My sincere thank to my supervisor project, Mr. Farid Bin Abidin who gave me so much suggestion, encouragement and ideas in doing this project. A special thank also to Mr. Ngah Ramzi which give much support in laboratory facilities.

Finally, a special dedication to my family and roommates for their caring, advice support and sacrifices that made this work possible.

Thank you again. May Allah bless all of you.

ABSTRACT

This paper described a new technique to identify insulator's cable condition using ultrasonic sensor and fuzzy logic. Ultrasonic sensor produced the signal that can indicate the level of degradation of cable insulator. Then the signal is transferred to the personal computer (PC) by using the computer microphone. The transferred signal then being stored Matrix Laboratory (MATLAB) workspace folder for further analysis. The application of Discrete Wavelet Transform (DWT) is used to extract the feature of the ultrasonic signal. Finally, the Fuzzy Logic (FL) from MATLAB simulation software is being proposed as a classification to differentiate between normal cable and fault cable. FL is capable to classify the signal by developing and appropriate rule and function.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.1 Introduction

Partial discharges are electrical discharges, which do not cause complete breakdown of the dielectric in one shot. It will involve the low of electrons and ions. It often occurs in high voltage ac system, will create main cause of aging in high voltage power cables. This proposed technique is developed by means of analysis of signal pattern from Partial Discharge (PD) activity and the process of identifying signal using fuzzy logic. The corresponding signal could be classified in order to give appropriate information for utility, manufactures and end-user whether the cable is still suitable to be installed [1]. The partial discharge can be detected when the ultra probe device was directed to the cables. After the signal have been recorded by using probe device, the signal then been transferred to the PC by using microphone. The application of wavelet transform technique has been implemented to analyzed the signal. The application of Discrete Wavelet Transform(DWT) as a wavelet transform technique been used to extract the feature of the ultrasonic signal. Recently, an integrating technique of implementing wavelet technique and ultrasonic signal is one of better solution from the conventional method and more friendly for non-linear problem in high voltage.[2]

Fuzzy Logic from MATLAB (version 6.5.1) has been used in this study. Fuzzy logic is a branch of machine intelligence which provides mathematical technique for representing and inferring from imprecise knowledge. There are two input that been analyzed by fuzzy logic in this thesis, one was by the magnitude of the signal and second by testing voltage. Each input contained three membership functions. By developing an appropriate rule and function based on membership function characteristic, it is capable to classify the signal