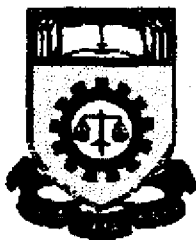


**COMPENSATING CAPACITOR PLACEMENT FOR VOLTAGE
STABILITY IMPROVEMENT AND LOSS MINIMIZATION**

**Project ilmiah is presented fulfillment for the award of the
Bachelor of Electrical Engineering (Honors)
UNIVERSITI TEKNOLOGI MARA**



HAIRUL AZHAR BIN ABDUL MANAP @ RAZAK

Faculty of Electrical Engineering

UNIVERSITI TEKNOLOGI MARA

40450 Shah Alam

Selangor

ACKNOWLEDGEMENT

I would like to express my deepest gratitude to my project supervisor, Mrs. Zuhaina Zakaria for her valuable guidance, comments and ideas towards the success of this project.

My gratitude also goes to my family who had given me moral support, assistance and prayed for my success. Also thank to my entire colleague for suggestion and contribution toward the success of the project.

I am also indebted to the various help and discussions offered by Mr. Mohd Hadi Sohod, Mr. M. Arunasalam and his teams of TNB Klang.

Finally, I would like to express my great thankfulness to various people that involved in this project, especially Mr. Mohamad Hamid Gadafi bin Danan.

ABSTRACT

This project discuss on voltage improvement for low voltage distribution system using compensating capacitor method. This method allocates capacitors to certain nodes which are selected by first identifying the branch which has the largest losses. A study is carried out on of a portion of Tenaga Nasional Berhad (TNB) Klang low voltage system. Selection of the area is based on the one that experience voltage drop beyond the tolerable margin. This method is applied to a 42 bus (nodes) low voltage distribution system of 415 V line voltage and 300 kVA of Kampung Perepat Baru, Kapar. This thesis also uses the Distflow load flow technique to compute power flow and voltage profile for radial distribution system.

TABLE OF CONTENTS

CHAPTER	DESCRIPTION	PAGE
1	INTRODUCTION	
	1.1 Introduction	1
	1.2 Voltage Stability	2
	1.3 Methods of Compensating Capacitor Placement	2
	1.4 Review of Capacitors Applications	3
	1.5 Scope of Thesis	4
2	L.V. SYSTEM'S CONFIGURATION	
	2.1 L.V. System's Configuration	5
	2.2 Distribution Substations	5
	2.2.1 Indoor Types (Separate Building)	6
	2.2.2 Indoor Type (In A Compartment)	6
	2.2.3 Outdoor Type	7
	2.2.4 Package/Compact Type	7
	2.2.5 Pole Mounted Type	7
	2.3 Low Voltage Network	8
3	VOLTAGE STABILITY	
	3.1 Voltage Stability	9
	3.2 Voltage Stability Analysis: P-V Curves	10
	3.3 Power Flow Technique for Evaluating Voltage Profile	13
	3.3.1 Load Flow Algorithm	16
	3.3.2 Simplified Voltage Stability Index	17
	3.3.3 Thevenin Equivalent Circuit	18

CHAPTER 1

INTRODUCTION

1.1 Introduction

The electrical energy is generated at the generating stations by dynamos and is distributed at appropriate voltage, which is kept constant. The element of good service to a customer includes continuity of service, proper voltage and correct frequency. Good service continuity requires a system where interruption of service is rare and is limited to the smallest practical number of consumers. Proper voltage requires that the voltage remains within a range established by an industry standard and momentary changes in load do not cause objectionable light flicker.

Voltage stability problems are not new to the electric utility industry or commercial area. Since voltage instability has been responsible for several major network collapses, many techniques have been developed to identify critical power system, buses and lines. T. K. Abdul Rahman and Jasmon developed a new technique to determine the static voltage stability of load buses in a power system for a certain operating condition and hence identify load buses that are close to voltage collapse. It is also present a new technique to compute power flow solution for radial network [1]. Kashem and Mahmoud studied the relationship between voltage stability and loss minimization in which it can be shown that voltage stability is maximized when power losses are minimized in the network [2].