TRANSIENT OVERVOLTAGES SUPRESSION TECHNIQUE AGAINST LIGHTNING

This Thesis is presented in partial fulfillment for award of the

Bachelor of Electrical Engineering (Hons.)

UNIVERSITI TEKNOLOGI MARA (UiTM)
SHAH ALAM, MALAYSIA

MUHAMMAD HAFIZI BIN MD HIDZIR
FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
40450 SHAH ALAM,
MALAYSIA
JULY 2012

ACKNOWLEDGEMENT

With the name of ALLAH Most Gracious Most Merciful

Alhamdulillah, a lot of thanks to ALLAH S.W.T for His wills and blessings, I successfully completed my Final Year Project (FYP) for my first degree of Bachelor of Engineering (Hons) Electrical (Power).

First and foremost, I would like to express my highest gratitude to my FYP Supervisor, Dalina Bt Johari for the right guidance and encouragement given from the early phase of my FYP project to the end of the last stage of my project thesis. My great appreciation goes to my family who has supported me throughout the years. Their love and motivation provides me the spirit to complete this thesis successfully.

I also would like to express my gratitude to all friends who always besides me and never stop giving the motivations and encouragement during FYP process.

Last but not least, special thanks to people around me who willing to give a hand during project thesis, May Allah bless all of you.

ABSTRACT

This paper presents the transient overvoltage suppression technique against lightning at UiTM Shah Alam. It involved with the development of a simulator model that can be used to analyze several transient overvoltage mitigation techniques. Power system computer aided design (PSCAD) software is used as it is user friendly and efficient in conduct power system simulations. This project used metal oxide surge arrester (MOSA) to mitigate the effect due to lightning strikes. The effect is mitigated by using three types of (MOSA) model, which are IEEE, Pincenti Giannettoni and Fernandez Diaz models. Using PSCAD software, the performance of the MOSA models were evaluated and compared. It was found that IEEE model can reduce the transient overvoltage better than Picenti Giannettoni, and Fernandez Diaz models.

TABLE OF CONTENT

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

The phenomenon of lightning has been the subject of intensity study by many people. The consequences and the behavior of lightning are unpredictable but in general term it is fairly predictable. Lightning is an electrical discharge in the air between the clouds, it is provided by warm air rising into a developing cloud. Discharge may occur from cloud to cloud, or from cloud to ground .The current which flows in the cloud to ground strike ranges about 2kA to 200kA with a log normal distribution [1]. When lightning strike the electricity distribution system, surge current is generated and conducted through power system into the facilities. Large impulsive transient overvoltage is produced due to this surge current. Lightning can strike directly to the phase conductors of overhead power lines producing very high magnitude transient overvoltage. Lightning also can strike the overhead earth wire (shielded wire) that is sometimes installed above the phase conductors to protect them from a direct lightning strike. This can lead to back-flashover to the phase conductors as the voltage on the earth wire to become much greater than the voltage on the phase conductors. Beside of direct lightning strike, lightning also can induce current and voltage on power lines system without touching it, this type of behavior is call indirect strike. The large electromagnetic field produced by lightning discharge can couple into the power lines system and produce induced transients. Current that generated from this indirect lightning usually less than 2kA with voltages less than 100kA [2].