MODELLING OF SOLID STATE IMPULSE GENERATOR

This Thesis is presented in partial fulfillment for the award of the

Bachelor of Electrical Engineering (Honours)

UNIVERSITI TEKNOLOGI MARA

ZAINUDIN BIN SAID
FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
40450 SHAH ALAM
SELANGOR DARUL EHSAN
MALAYSIA

ACKNOWLEDGEMENT

In the name of ALLAH, I would like to express my gratitude to my supervisor Puan Fuziah Sulaiman for her guidance and ideas in accomplishing this dissertation. I would also like to take this opportunity to thank several UiTM laboratory staffs for their cooperation and assistance.

Lastly, I would like to say a very big thank you to all the lecturers in UiTM Shah Alam for their direct and indirect support to complete my final project. I'm very proud to be a UiTM student during my study period here.

Zainudin Bin Said
University Of Technology MARA (UiTM) Shah Alam.

ABSTRACT

This paper presents the application of solid state device used in the impulse generator. Through the advancement of solid state technology, these devices are widely used in high voltage testing. The principle of high voltage Marx Generator is employed by means modeling high scale into low scale circuit. MOSFET is used to replace the sphere gap as switching device. The uses of this device is very important in order to control charging and discharging process beside setting the square wave supply. Pspice simulation is the theoretical comparison to the experimentation that had been conducted in the laboratory.

CONTENTS

CHAPTER 1

1.0 Introduction

Power system equipment must withstand not only the rated voltage, which corresponds to the highest voltage of the particular system, but also over voltage [1]. According to this statement, it is necessary to test h.v equipment during its development stage and prior to commissioning. The magnitude and type of test voltage varies with the rated voltage of a particular apparatus. It is very important to check the reliability and the performance of the equipment by injecting the high voltage impulse to the system as an emulation of the disturbance. Basically there are two major sources of disturbance that must be considered before any power apparatus is designed. They are lightning strike and switching surge.

Lightning strokes represent true danger to life, structures, power system and communication networks. Lightning is always a major source of damage to power system especially the transmission network where equipment insulation may break down under the resulting overvoltage and the subsequent high-energy discharge [2]. The magnitude of these overvoltages may reach several thousand kilovolts. Lightning overvoltage is characterized by short front duration, ranging from a fraction of a microsecond to several ten of microseconds and then slowly decreasing to zero. The standard impulse voltage has been accepted as an aperiodic impulse that reaches its peak value in 1.2 μsec and then decreases slowly to half its peak value. Full details of the waveshape of the standard impulse is presented in next chapter.

The second disturbance is switching surge. Transient overvoltage accompanying sudden changes in the state of power system e.g switching operation or faults, is known as switching impulse voltage. Switching impulse voltage is usually the dominant factor effecting the design of the power