

ANALYSIS OF TRANSIENT OVERVOLTAGE IN MEDIUM VOLTAGE DISTRIBUTION

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ABSTRACT

There was a recent incidence where a direct lightning strike on distribution network which can cause the overvoltage. This paper presents the analysis of transient overvoltage in medium voltage distribution. Transient overvoltage is one of the common power quality disturbances in electrical distribution result from the unavoidable effects of lightning strikes. The objective of this paper is to analyze the performance of shield wire and surge arrester when lightning strike on phase wire and distribution substation. This analysis is performed by varying the value of lightning current stroke at medium voltage distribution. PSCAD/EMTDC software program is used to carry out the modeling and simulation works. Shield wire and surge arrester are installed as a protection from lightning strike at distribution network. The result of the significant role of shield wire and surge arrester in protecting overhead distribution lines is analyzed. The line with shield wire can reduce the flashover in open ground and surge arrester is the protection equipment that use for a better protection at distribution.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDIES

The lightning is a natural phenomenon generated during thunderstorm by electrostatic discharge which produced electromagnetic radiation[1]. Lightning overvoltage are one of the most frequent cause of the medium voltage distribution system outage[2]. A major cause of fault on typical overhead distribution lines and a powerful natural electrostatic discharge produced during thunderstorm. Transient overvoltage causes power system faults that eventuate into supply interruption and voltage sag s throughout the distribution network[3]. There are three classification categories of lightning discharge which is intra cloud lightning, cloud to cloud lightning and cloud to ground lightning [4]. The cloud to ground discharge has been considered for overhead distribution lines design. Lightning remains the largest single cause of faults and damage on overhead distribution lines even in areas of moderate lightning activity as stated at [5].

For lightning course, it can be divided into two types either direct or indirect strike. Considering direct strike, an impulse lightning current is injected into overhead line section which lead to cause surge voltage propagate towards the power transformers, cables and the rest of the system transformer. Direct strikes is high energetic compared with indirect strikes because high frequency of occurrence. Besides that, lightning can induce currents and voltage on power lines without touching them known as an indirect strike[3]. The large electromagnetic fields