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A Review on Fault Classification Methodologies in Power Transmission Systems: Part – I

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Abstract **–**This paper presents a survey on different fault classification methodologies in transmission lines. Efforts have been made to include almost all the techniques and philosophies of transmission lines reported in the literature. Fault classification is necessary for reliable and high speed protective relaying followed by digital distance protection. Hence, a suitable review of these methods is needed. The contribution consists of two parts. This is part 1 of the series of two parts. Part 1, it is a review on brief introduction on faults in transmission lines and the scope of various old approaches in this field are reviewed. Part 2 will focus and present a newly developed approaches in this field.

Index Terms- Fault; Fault Classification; Protection; Soft Computing Techniques; Transmission Lines.

I. INTRODUCTION

Here transmission lines shield against uncovered deficiency is the most basic errand in the assurance of power system. Faults in overhead lines are an unusual condition, brought on by climate conditions, human mistakes, smoke of flames, hardware letdowns, for example, pivoting machines and transformers, and so on. These issues cause intrusion to electric streams, hardware harms and even cause passing of people, winged creatures, and creatures. These issues are hazard to the congruity of power supply. Fault is nothing but an abnormal condition. For easy to understand, this paper comparing transmission system faults with human diseases. For example, a healthy person in his day to day life disturbs whenever he faces any abnormal condition, here abnormal condition in the sense nothing but diseases like cold, cough, fever, heart attack, cancer etc. In a similar way in power transmission systems the system quantities (voltage, current, phase angle etc.) exceeds its threshold values whenever the system faces an abnormal condition, this is called as a fault. The maximum part of the overhead transmission line exposed to atmospheric condition, so the chances of occurrence of faults in overhead transmission lines were more when compared to underground cables. Faults in overhead transmission system can be classified into two types, i.e. series (open conductor) faults, and shunt (short circuit) faults. Series faults can be identified easily by observing the each phase voltage. If the voltage values increases, it indicates that open conductor fault is occurred. These faults are classified into two types, i.e. one open conductor faults, and two open conductor faults. These faults are very rarely occurred faults. Short circuit faults can be identified easily by observing the each phase current. If the current values increases, it indicates short circuit fault is occurred. Short circuit faults are divided into two types, i.e. asymmetrical faults, and symmetrical faults. Asymmetrical faults line to ground (LG), line to line (LL), and double line to ground (LLG), and symmetrical faults are triple line (LLL) and triple line to ground (LLLG) faults. The Fig. 1. shows the classification of faults in overhead transmission system, in this figure A, B, C, and G indicate phase A, phase B, phase C, and ground respectively.

The frequency of occurrence and severity of the faults are going to be compared again with human diseases. The most commonly occurring fault is LG fault and the most commonly occurring diseases are headache,

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