A COMPARATIVE STUDY OF CAPACITOR PLACEMENT OPTIMIZATION (CAPO) AND BUS RANKING METHOD USING PSS/ADEPT FOR IEEE 33 BUS SYSTEM NETWORK

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ABSTRACT

For the past few years a lot of methods have been searched to improve voltage regulation and reduce power losses in distribution system. This distribution system is the part which is connecting the distribution substation to the consumer service. This work research work focuses on comparison between Bus ranking method and Capacitor Placements Optimization (CAPO) applications to overcome these entire problems. The capacitor placement has been implemented in the network to minimize the total losses and improving the voltage stability. These two methods are to improve the voltage stability and reduction of power loss with additional capacitor at certain place in distribution system. Capacitor placement must determine the optimal location, type (fixed or switched), size and the control setting of capacitors to be installed on the distribution system.

This method has been implemented using Power System Simulator/Advanced Distribution Engineering (PSS/Adept). PSS/Adept is used to model, simulate and analyze network in distribution system. Proposed method is implemented in the IEEE 33 Bus network. The effect of using Bus ranking method and CAPO application will show in this network within the result based on minimum voltage and total power losses. Based on the result obtained, it shows that by installing capacitor at suitable location with an appropriate sizing by using Bus ranking method there will be lower total power losses and higher voltage level in the distribution network. Bus ranking method gives better performances in order to improve objective of this research work.

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INTRODUCTION

1.1   BACKGROUND OF STUDY

Nowadays growing load on distribution system makes increase of reactive power demand necessary to maintain the voltage within acceptable level. Based on this project is referring to the network distribution system which is added component to reduce problem power losses and also maintain voltage at the suitable level. The power system can be divided into 3 subsystems which are generation, transmission, and distribution system. The distribution system is responsible for transferring of electrical energy from nodes (substations) to load point.

Basically when electric energy transfers from the source to the consumer via transmission and distribution system it will caused a lot of losses. The major losses actually produced at distribution system. Large losses can affect the distribution system in term voltage level to supply to the consumer. The network distribution produces a voltage which is depending on the distance of the load bus. If the load bus is located far away from the substation, it will produce higher low voltage. Besides that at the end of the load bus will cause higher power loss. Electrical power losses in distribution system correspond to about 70% of total losses in electric power systems [2]. This problem has been received considerable attention from researchers and distribution engineers [3], [4]. To improve distribution system performance with respect to its supply capability, reduction of power loss and voltage profile, the load reactive power should be compensated.

A lot of method is use to overcome power losses or others problem that is related to the load bus which is produce low voltage level. By using Ant Colony Search