OPTIMAL DISTRIBUTED GENERATION PLACEMENT IN RADIAL DISTRIBUTION SYSTEM

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ABSTRACT

Recent years, distribution generators have been increasingly installed in distribution system in many parts of the worlds. Depending on their characteristics and locations, Distribution generators could significantly affect the voltage profile and network losses in distribution system.

This paper studies the influences of distributed generators (DG) placement in radial distribution systems. The purpose is to minimize losses and increase the voltage profile. In this study the optimal DG placement was simulated using power system simulation programme for planning, design and analysis of distribution system (PSS/Adept) software.

The proposed technique was tested on the IEEE 33- bus distribution test system and IEEE 69-bus distribution test system where variation of loading condition was being considered.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Rapid industrialization process and population growth has resulted in an escalation in the electrical power consumption. The limited areas and slow progress in network expansion has also caused areas with high load densities. At the same time, rural electrification are experiencing poor network performance in terms of large voltage drop and high distribution losses along the lines[1]. There is currently a great deal of interest in distributed power system in both environmental and public policy perspective. Proper placement will also free available capacity for transmission of power and reduce equipment stress[2-3].

Moreover, cost savings can be expected by deferring transmission and distribution upgrades Dispersed, or distributed generation (DG) will affect the electric power system at the system and, more directly, at the distribution level. This study investigates transmission and distribution losses based on location. Simulations will show that proper placement of the units will reduce losses normally seen by the system while improper placement may actually increase system losses. By integrating DG into the utility's power grid, line upgrades can be postponed, and there exists the possibility of greater efficiency of power delivery. Power flows should be reduced, and thus, losses minimized. In particular, heavily loaded feeders or transmission corridors can be relieved. It may also be an opportunity to improve power quality allowing customers and utility equipment more years of usage [3].

Placing DGs to minimize loss based upon a single load point, such as the peak load, may not provide the same optimal solution as when the entire time varying load pattern is considered, therefore time-varying loads are taken into account. Applying DGs to a distribution system may also contribute to improving system reliability. Thus maximizing reliability can also be a criterion for seeking optimal DG location. [4]