

INTEGRATION OF DISTRIBUTED GENERATORS INTO POWER SYSTEM FOR LOSS MINIMIZATION AND VOLTAGE STABILITY

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ABSTRACT

This paper describes the integration of distributed generators (DG) into the power system to analyze the losses and voltage stability. The location of DG is based on the weakest bus determined heuristically with the objectives to minimize losses and to improve the voltage stability. The size of DG can be integrated at the weakest bus. Load flow analysis is used to simulate the power loss and voltage profile of the system. The proposed method was applied to a 6-bus and 14-bus IEEE system to show its capability and feasibility. All simulations were done using the MATLAB version 7.6 programming.

Keywords - Distributed generator, losses, voltage stability, load flow analysis.

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CHAPTER 1

INTRODUCTION

1.0 BACKGROUND

Distributed generation (DG) is an emerging concept in electricity market which represents good alternative for electricity supply instead of traditional central generation concept [1]. The planning of the system in presence of DG will require the assessment of several factors such as the number and the capacity of units, best possible location in the network, and the impact of DG on the system operation characteristics such as system losses, voltage profile, stability and reliability issues [2]. Most types of DG utilize traditional power generation paradigms such as diesel, combustion turbine, combined cycle turbine, and low-head hydro or other rotating machinery. But in addition, DG includes fuel cells and renewable power generation methods such as wind and solar [3].

The problems involving the integration of DG are not easy to deal with. Some contributions have been developed to solve parts of the problem [3]. When the DG were installed in distribution feeders and participated into system operation, the problems including changes of power flows, power quality, ferroresonance, voltage control, losses reduction, protection device coordination and voltage flicker etc., all need to be taken into account. Therefore, an efficient and robust power system load flow method taking the mathematical model of DG into account is the basic requirement for those analyses.

This project presents the integration of DG into power system to minimize the losses and to improve the voltage stability. Newton-Raphson power flow solution is used to determine the total minimum losses and voltage profile. The size and location will be determined using heuristic method.