LOSS MINIMIZATION AND ECONOMIC GENERATION OF APPLIED DISTRIBUTED GENERATION IN NETWORK SYSTEM

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ABSTRACT

Distributed Generations (DGs) are being increasingly utilized in power system distribution networks to provide electric power at or near load centers. These are generally based on technologies like solar, wind and biomass and range from 10 kW to 150 MW. It is expected that increasing amounts of distributed generation (DG) will be connected to the power system in the future. Advances in technology, deregulation in the market to end the monopoly of the vertically integrated power utilities, alternative energy sources that are becoming more cost effective are encouraging the growth of this new technology. Although there are many advantages, there are many issues to be considered for the interconnection of DG's, like the sizing and siting of the DG. Since it is necessary that the voltages be within a specified limit, this problem of the siting and sizing of the DG has taken top priority as they affect the voltages and operations of the distribution power system. 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 14-bus IEEE system to show its capability and feasibility. All simulations were done using the MATLAB version 7.6 programming.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Distributed Generation (DG) is the concept of decentralizing the power generation by placing small generating units (typically 1 kW – 150 MW) at or near the load center to meet specific customer needs, to support economic operation of the existing power distribution grid, or both [1]. It is an emerging evolution of the electric power generation systems, in which all the generating technologies available in a given centralized or decentralized region are integrated in the power supply system according to the availability of their respective resources. These resources are known as distributed energy resources (DERs) [2].

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]. The electric power system is divided into three parts, generation, transmission and distribution subsystems. During last few decades there have been many changes in the electric power industry due to development in distributed generation technologies, economic policy and restructuring. Fig 1.1 and 1.2 demonstrate the traditional and modern power system.