Optimal placement and sizing of dg system using pso

Project Proposal

" Optimal Placement and Sizing of DG System using PSO"

Introduction

An electric power system contains Transmission, Generation and Distribution systems. The concept of distribution generation (DG) has focused attention in power industry from the last few years because of the continuous increase in electricity demand, inadequate conventional resources and incessant growth in nonconventional energy based low voltage and small scale power industry [1]. A large amount of transmission loss occur as the transmission and distribution networks are very long. This long transmission network also creates network congestion in the restructure environment. Conventional power plants such as coal based thermal power plant, nuclear power plant have very large impact on environment. Due to this the non-conventional source of energy-based power plants are gaining popularity around the world. As it has less maintenance and operation charge, better reliability, smaller in size and law environmental impacts, the use of non-conventional source of energy-based power plants as generating units in the distributed generation system is increasing. Choosing the optimal size of DGs and its optimal location in the network system is one of the tough tasks of the power system problems. The penetration level of DG increased the level of problem complexity. According to IEEE survey, penetration level in DG is expected to reach 28% and 32% in Asia pacific regions and Europe in next five years [2]. By installing the optimal size DG at optimal location, there are

numerous benefits that can be achieved whereas inappropriate placement and sizing can worsen the situation [3].

Smart Grids have superior abilities to predict present and future energy demand. These demands require implementation related with concepts of resiliency, transmission and distribution, reliability, environment friendly generation as well as converting consumers to prosumers. A smart grid also relates the state-of-the-art technologies to optimize the usage of its resources. For instance, optimized size can be achieved by dynamic ratings, which allows resources to be expended at larger loads by continuously detecting and evaluating their capacities [4]. Two important aspects in this area of resource optimization are (1) sizing and (2) placement of DGs. The size of DG is decided by load. The decision for DG location depends on various factors like fuel availability, climate condition and land right of way [5]. Thus, the issue of DG placement and sizing is of great importance. Power loss minimization and voltage profile improvement are the two most important objective for DG placement and sizing.

Many researchers have worked previously in this area using various algorithms. Mohammad Jafar Hadidian, Saber Arabi Nowdeh has worked on optimal sizing and siting of DG system using ant lion optimization technique [6]. Mahesh Kumar, Perumal Nallagownden has also worked for optimal placement and sizing of DG for radial distribution system [7]. [8] introduced 2/3 analytical method for power loss reduction. A method based on exact loss formula was used by [9]. Optimal sizing and placement using Genetic Algorithm is developed by [10]. The power loss minimization using PSO has been presented in [11] for optimal sizing and placement of DG.

In this project particle swarm optimization technique will be used to obtain optimal sizing and location of DG considering its operating power factor. This optimal placement of DG is beneficial for the areas which are located far from the substation.

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