Optimal location of distributed generation sources and capacitors synchronously using genetic evolutionary algorithms and particle swarm

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Abstract

Today, distributed generation sources and capacitors play a significant role in the technical and economic environment for power systems. Using distributed generation resources can reduce network losses and also improve the voltage profile and thus increase network power quality. Also, the capacitor can play an important role in improving the voltage profile and reducing reactive power losses. If the location and size of the distributed generation sources and the capacitor are selected without studying the quality of power, it can cause serious damage to the power system both technically and economically. In this paper, the problem of determining the capacity and location of distributed generation and capacitor synchronously on the IEEE 69-bus standard network is investigated using genetic algorithms and particle swarm and the results of these two algorithms are also compared.

Keywords: distributed generation sources, Capacitors, Simultaneous location, Genetic Algorithm, Particle Swarm Algorithm

1. Introduction

Distributed generation sources, as compared to conventional power plants, can bring great benefits to the power system. Most of these benefits are due to the proximity of generation to consumption. Distributed generation sources, due to the fact that they are located in the consumer sector, reduce network losses and improve the voltage profile. There are different types of distributed generation sources, but in this paper, distributed generation sources mean the production of electrical energy on the consumer side [1]. In order to be able to use the maximum benefits associated with this type of resource in the power system, the optimal location and size of these resources that are located in the different layers should be considered and the lack of attention to this issue can lead to an increase in network losses and a decrease in the quality of electrical power [2]. Studies show that about 70% of losses occur in the distribution system [3], and in fact about 13% of electrical energy production is included in losses [4]. Therefore, the presence of these resources can play an important role in