Optimal Management of Distribution Networks in The Presence of Intelligent Methods

Arash Moradzadeh * , Navid Taghizadegan Kalantari

1. Department of Electrical & Electronics Engineering, East Azarbaijan,Islamic Azad University of tabriz, Tabriz, Iran, Email: Arash.orton.z@gmail.com
2. Department of Electrical Engineering, faculty of engineering, azarbaijan shahid madani university, Assistant professor ,Tabriz, Iran, Email: taghizadegan@azaruniv.edu

Abstract

Power losses reduction and voltage profile improvement are goals for electricity utilities. Distribution system reconfiguration and optimal capacitor placement are two of the low Cost available tools to Power losses reduction and voltage profile improvement. Reconfiguring the network means altering its topology by changing the status of normally opened and normally closed switches. This paper proposes the use of plant grows simulation algorithm (PGSA), to optimize the distribution system reconfiguration by minimizing the active power losses, considering as constraints the radial characteristics of the distribution networks and feeder capacity, and use of OCP environment in ETAP software to optimal capacitor placement to improve the voltage profile. The proposed method is tested on 33 bus test system and the results are significant.

Keywords: optimal management,distribution networks, Power losses reduction, voltage profile improvement,intelligent methods

1. Introduction

Distribution system is the final link between high voltage transmission systems and consumers. Distribution systems are the networks that transport the electric energy from bulk substation to many services or loads, thus causes more power and energy losses. Hence there is a need to reduce the system losses. By minimizing the power losses, the system may acquire longer life span and has greater reliability. Feeder reconfiguration is a very important tool to operate the distribution system at minimum cost and improve the system reliability and security. The reconfiguration of a distribution system is a process, which alters the feeder topological structure by changing the open/close status of the switches in the distribution system. Two types of switches, normally closed switches (sectionalizing switches) and normally open switches (tie switches), are used in primary distribution systems for protection and configuration management. Distribution network reconfiguration for loss reduction is a complicated combinatorial, non-differentiable, constrained optimization problem since the reconfiguration involves many candidate switching combinations. Several papers have considered the problem of optimal network reconfiguration using different optimization