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QUANTUM INSPIRED EVOLUTIONARY PROGRAMMING OPTIMIZATION
TECHNIQUE FOR OPTIMAL NETWORK RECONFIGURATION APPROACH IN
DISTRIBUTION SYSTEM

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ABSTRACT

This paper presents an optimization technique used to identify optimal network reconfiguration. Network reconfiguration is performed by altering the topological structure of the distribution feeder. It provides an efficient way to control the tie-line and sectionalizing switches. By reconfiguring the network, voltage stability can be improved and at the same time system total losses can also be minimized for particular set of loads in a distribution system. This however, due to its difficulties on optimizing technique that has been long used to developed, adopted as well as to improve this particular application, the proposed technique was developed based on the hybridization of quantum mechanics concepts with the Evolutionary Programming (EP) optimization and it is named as Quantum-inspired Evolutionary Programming (QI-EP). This paper utilized IEEE 69- bus system in this research. Other than minimizes the loss and stabilizes the voltage in network reconfiguration system, the research also study the performance of Quantum-inspired Evolutionary Programming (QI-EP) and identify which is the best loss minimization technique for optimal network reconfiguration.

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CHAPTER 1:

INTRODUCTION

Distribution systems are critical links between the utility and customer, in which sectionalizing switches are used for both protection and configuration management. Usually, distribution systems are designed to be most efficient at peak load demand. Network can be made more efficient by reconfiguring it according to the variation in load demand. Recent studies stated that the total power generation is wasted in the form of line loss at the distribution level. It is of great benefit to investigate methods for network reconfiguration [1]. The objective of network reconfiguration is to reduce power losses and improve the reliability of power supply by changing the status of existing sectionalizing switches and ties.

In other words, Distribution systems consist of groups of interconnected radial circuits. The configuration may be varied via switching operations to transfer loads among the feeders. Two types of switches are used in primary distribution systems. There are normally closed switches (sectionalizing switches) and normally open switches (tie switches). Those two types of switches are designed for both protection and configuration management. Network reconfiguration is the process of changing the topology of distribution systems by altering the open/closed status of switches. Because there are many candidate-switching combinations in the distribution system, network reconfiguration is a complicated combinatorial, non-differentiable constrained optimization problem [11].