Novel approach for DG Power optimization by Multi objective Genetic algorithm

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Abstract- Power distribution networks are mostly operated in radial configuration. The dynamics of the distribution system operations often requires reconfiguration of the network. Distribution network reconfiguration is achieved by using sectionalizing switches that remain normally closed and tie switches that remain normally open. The main purpose of the reconfiguration is to minimize active power losses in order to improve distribution system performance addresses performance enhancement of distribution network with distributed generator (DG) integration using modified multi objective genetic (MG) algorithm. In aim of network reconfiguration is to minimize active power losses and to improve voltage quality. The constraints of network reconfiguration problem are load flow equations, upper and lower limits of bus voltages, and upper and lower limits of line currents. The effort of performance enhancement is done by using optimization of distribution network configuration. The objective of the optimization is minimizing active power loss and improving voltage profile while the distribution network is maintained in the radial structure. In this study, configuration optimization method is based on a modified MG algorithm. The method has been tested in an IEEE model of 33-bus radial distribution network test system and a real-life radial distribution network of 33-bus distribution system. The simulation results show the importance of reconfiguring the network for enhancing the distribution network performance in the presence of DG.

Keywords-DG, optimization, BUS33, LOSS

I. INTRODUCTION

Distribution network reconfiguration (DNRC) is a framework changing procedure performed by control utilities of movement frameworks for different purposes. It is refined by changing the affiliation status of allotment arrange branches by trading on/off customarily close/open switches in the structure to such a degree, to the point that a perfect framework topology achieved, which gives the best execution with respect to some foreordained targets. Nowadays, DNCR has more significance when broad amounts of distributed generations (DGs) are ordinary and being acquainted in scattering framework with help natural stresses and furthermore to upgrade the imperativeness security.Every DG have distinctive working qualities and particularly sunlight based and wind based, which are accessible in plenitude all over the place, have less/poor control over their responsive power yield[2], which adversely impacts on keeping up the network voltage profile. Since, inexhaustible based DGs are normally worked at solidarity control factor for financial reasons with no commitment of receptive energy to the heap, particularly in low entrance of such sort of sustainable generations. In any case, because of exponential increment in stack, the interest for responsive power later on is probably going to expect DGs to work at different power factor for extra receptive power support to meet worthy voltage profile and furthermore line misfortunes are to be kept up inside utmost in the network. Besides, at distressing stacking conditions, particularly amid top stacking conditions, network reconfiguration alone may not be adequate to help the network if the DGs are worked at solidarity control factor and, if the receptive power is bolstered by DGs then itwill decrease net dynamic power yield, which can be considered as vitality squander. In most pessimistic scenario, sustainable based DGs (sun based and wind)could be evacuated/closed down from their operation if responsive power shortfall can't be overseen from different sources/alternatives[5]. In this manner, to help the responsive power various sources are accessible however separated from it there is another choice to use DNCR, which help to ease receptive power shortfall and decreases wastage of vitality from DGs while at the same time enhancing voltage profile too in working skylines. DNRC is an optimization problem which is considered a highly non-linear, mixed integer type and non-differentiable multi objective problem which renders it impractical to solve with traditional optimization approaches. This is due to the discrete nature of the switches and the characteristics of different constraints and objective functions of the network reconfiguration problem [1]. With the growing popularity of remote terminal units and supervisory control and data acquisition (SCADA) for distribution automation, real time DNRC has become more feasible option for power utilities for control and management of the electric grid. The optimization process is further complicated when the variations in the load and the generation from renewables DGs, e.g. wind and solar are considered.

II. LITERATURE REVIEW

Jin, Xiaoping, et al. [1]In this paper, they explained a strategy in light of adjusted binary particle swarm optimization(BPSO) is proposed for distribution network reconfiguration with the goal of load adjusting. A novel model to disentangle distribution network is displayed. The feeder reconfiguration issue is defined as a non-direct improvement issue, and BPSO is utilized to locate the ideal arrangement. As per the qualities of distribution network, a few alterations are done to hold the spiral structure and diminish seeking necessity. Test outcomes in light of a specimen network have demonstrated that the proposed feeder reconfiguration strategy can adequately keep stack adjusting, and the BPSO method is proficient in hunting down the ideal arrangement.

Abdelaziz, Almoataz Youssef, et al. [2]This paper exhibits the Particle Swarm Optimization (PSO) calculation for solving the ideal distribution framework reconfiguration issue for control misfortune minimization. The PSO is a moderately new and effective insight development calculation for taking care of improvement issues. It is a populace based approach. The PSO is initially roused from the social conduct of fledgling runs and fish schools. The proposed PSO calculation in this paper is presented with a few adjustments, for example, utilizing a dormancy weight that declines directly amid the reproduction. This setting permits the PSO to investigate an extensive zone toward the begin of the recreation. Additionally, an adjustment in the quantity of cycles and the populace estimate is exhibited. Similar examinations are directed on two test distribution frameworks to confirm the viability of the proposed PSO calculation. The got comes about are contrasted and those gotten utilizing different procedures in past work to assess the execution.

Jazebi, S., S. H. Hosseinian et al. [3] This paper implements a combinatorial process based on reconfiguration and DSTATCOM allocation in order to mitigate losses and improve voltage profile in power distribution networks. The distribution system tie switches, DSTATCOM location and size have been optimally determined to obtain an appropriate operational condition. Differential evolution algorithm (DEA) has been used to solve and overcome the complicity of this combinatorial nonlinear optimization problem.

Li, Zhenkun, et al. [4]This approach is a blend of the binary PSO algorithmand the discrete PSO calculation. In the critical thinking process, the distribution network is disentangled through gathering the branches, and afterward each gathering of branches is spoken to by one dimensional coding. In view of the DNR vital condition outlined in this paper, particles are developing frequently, and this enhances the proficiency of the inquiry procedure. Each cycle of emphasis inside the enhancement procedure is proficient through two stages. The initial step is utilizing the roulette wager technique to pick the ideal gathering of branches that ought to be opened, and this strategy depends on the sigmoid ( ) work an incentive in the twofold PSO calculation. The second step receives the discrete PSO calculation proposed in this paper to additionally choose the ideal branch that ought to be disengaged in the gathering chose in the initial step. Reproduction on a commonplace 69-hub case is led, the aftereffect of which has shown both a quick joining and a decent power of this half and half approach.

Olamaei, J., T. Niknam et al. [5]This paper presents a new approach to DFR at the distribution networks considering DGs. The main objective of the DFR is to minimize the deviation of the bus voltage, the number of switching operations and the total cost of the active power generated by DGs and distribution companies. Since the DFR is a nonlinear optimization problem, we apply the particle swarm optimization (PSO) approach to solve it. The feasibility of the proposed approach is demonstrated and compared with other evolutionary methods such as genetic algorithm (GA), Tabu search (TS) and differential evolution (DE) over a realistic distribution test system.

Syahputra, Ramadoni et al.[6]In this study, the technique of network reconfiguration is based on an extended fuzzy multi-objective. Multi-objective function are considered for the power loss minimization, deviation of bus voltage, and load balancing among the feeders, while subject to a radial network structure in which all loads must be energized.

Syahputra, Ramadoni et al. [7]This paper introduces a reconfiguration strategy in view of a fuzzy multi-objective approach for accomplishing the base dynamic power misfortune and the most extreme voltage extent of spiral distribution networks with distributed generations. Multi-target work are considered for stack adjusting among the feeders, minimization of the genuine power misfortune, deviation of hubs voltage, and branch current imperative infringement, while subject to a spiral network structure in which all heaps should be stimulated. These target capacities are displayed with fluffy sets to assess the uncertain idea of every goal.

Bernardon, D. P., et al.[8]This paper presents a new methodology to perform the automatic reconfiguration of distribution networks incorporating distributed generation in normal operation. The power generation availability of wind turbines, solar photovoltaic panels and small hydropower are considered in the reconfiguration process. The real-time reconfiguration methodology is based on a heuristic method to determine the best settings. The method assumes that only remote controlled switches are considered in the analysis.

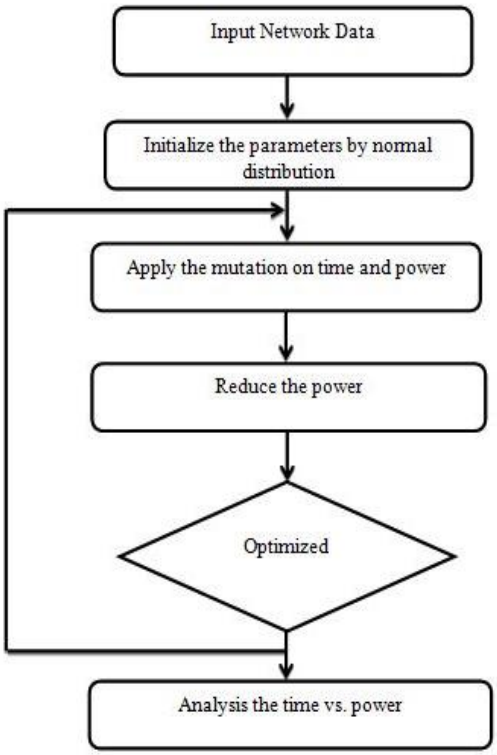
Rao, R. Srinivasa, et al. [9]This paper introduced another technique to tackle the network reconfiguration issue within the sight of distributed generation (DG) with a goal of limiting genuine power misfortune and enhancing voltage profile in distribution framework. A meta heuristic Harmony Search Algorithm (HSA) is utilized to at the same time reconfigure and recognize the ideal areas for establishment of DG units in

a distribution network. Affectability investigation is utilized to distinguish ideal area s for establishment of DG units.

Farahani, Vahid et al. [10] Reconfiguration technique proposed in this paper depends on a basic branch exchange strategy for single loop. In this straightforward technique for branch trade, circles determination arrangement influences the ideal design and the network misfortune. Along these lines, this technique has been enhanced by advancing the grouping of circles determination for limiting the vitality misfortunes in this paper.

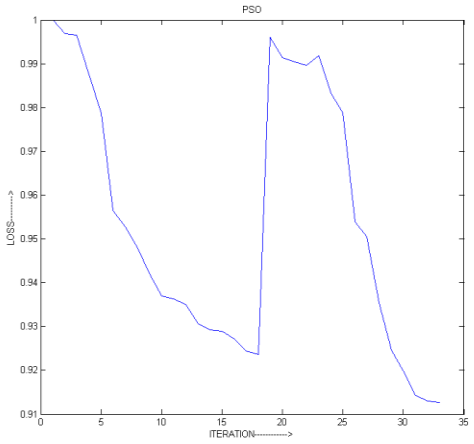
III. METHODOLOGY

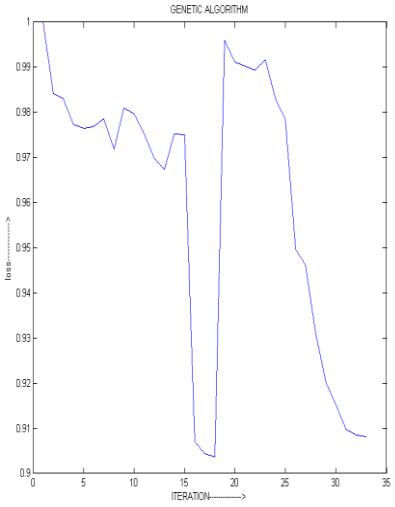
Step 1: Input the network data.
Step 2: Initialize the parameter by normal distribution.
Step 3: Apply the mutation on time and power.
Step 4: Reduce the power.
Step 5: Optimized the power if optimized then analysis the time vs. time if not then retransmit

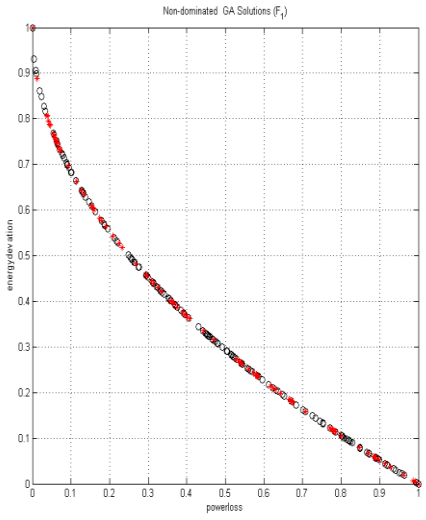


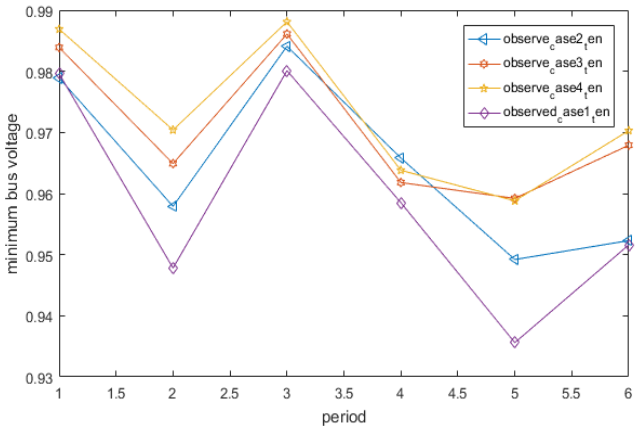
IV. RESULTS

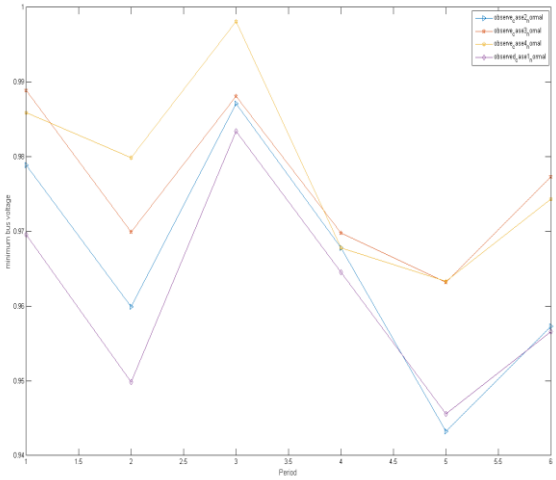
Here, this result shows the comparisons between Genetic Algorithm and PSO using various parameters











V. CONCLUSION AND FUTURESCOPE

.In proposed a methodology for optimal reconfiguration of radial distribution network with the presence of DG using modified Multi objective Genetic algorithm. The methodology was based on minimizing power losses and improving voltage quality in order to enhance distribution system performance. The methodology was tested on a standard of 33-bus radial distribution network test system and a practical 60-bus radial distribution system of districts. Based on the numerical results, it was shown that the algorithm is effective in enhancing efficiency of the two test distribution systems. Efficiencies of the 33-bus radial system in the original condition, after integration of five DGs, and after network reconfiguration are 95.19%, 96.41%, and 97.99%, respectively. For a 33-bus distribution system, the efficiencies in the original condition, after integration of seven DGs, and after network reconfiguration are 97.53%, 98.20%, and 98.89%, respectively. For voltage profile of the network, integration of DG in the two test radial networks has resulted in improved voltage quality. The quality is to be improved further by reconfiguring the networks. IN future enhance this work on real dataset and dynamic load which optimize dynamically.

VI. REFRENCES

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