Novel Frame work for Reduction of power loss in distribution electrical system with water cycle approach

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Abstract-
distribution transformers again perform the voltage reduction for its utilization process in distinct areas such as household appliances, lighting, industrial equipment etc. Some of the consumers gets the supply from single (one) transformer through secondary-based distribution lines. The residential and the commercial consumers are linked to secondary distribution lines through the service-drop mechanism The gradient and BAT methods and Hybrid BAT with (grey wolf optimization) GWO of solving In result show the percentage of loss all distribution of power in configured, BAT and GWO_BAT approach using different bus system like 33 and 36 bus system in proposed approach show the significance improve by 37% and 38.23% but only BAT algorithm 33% and 34% because it's not optimize using only local transmission which not able global optimization.

Keywords- *Distributed Generation, Voltage Stability Index, Optimal Reactive Power Dispatch, Water Cycle Optimization*

I. INTRODUCTION

The energy plays a vital role for all the humans as the it can neither be created nor it get destroyed but it can move/transform from one place to other. The modern living has realized the increased importance of energy as the life is moving faster, there is big need for fast communication, fast transport and manufacturing processes. So, energy industry forms one of the biggest consumer market [1, 2]. The use of electric power system requires an alternative generation because of its large demand by the consumers. The electricity cost is calculated based on different proportions such as 50% for fuel consumption, 25% for distribution, 20% for generation, and % for transmission which has created an alert to use or generate the alternative resources of power. For the levels of distribution, the ratio of reactance to resistance (X/R) is low when compared to levels of transmission which has resulted in high power losses and voltage magnitude dip along the distribution (radial) lines. The distribution systems must be able to provide energy/electricity to each consumer at an appropriate form of voltage rating. The modern forms of power are complex in nature with multiple load centres and generating stations interconnected through the transmission and distribution networks. The main objective of the energy based power system is energy generation and to deliver the energy/power at to its customers at its rated voltage-based value with minimum losses [3, 4].In case of heavy loading condition, the reactive form of power flow is the major cause of losses, thus reducing the levels of voltage simultaneously. So, there is occurs a big need to minimize real losses of power and to improve the level of voltage in distribution systems. In such cases, a variation occurs in the network configuration usually varying by the operation based on switching meant for transferring the load among the feeders

1.1 Electrical Power Distribution

The electrical power distribution represents the final stage of power delivery. It usually carries power or electricity from the transmission system to its customers on individual basis. When the distribution system gets connected to transmission system, it lowers the transmission voltage to a medium form of voltage lying between 2KV and 35KV with the help of transformers used in the system [5, 6]. The primary lines of distribution carry medium voltage to the transformers in the distribution section placed near customer's location.

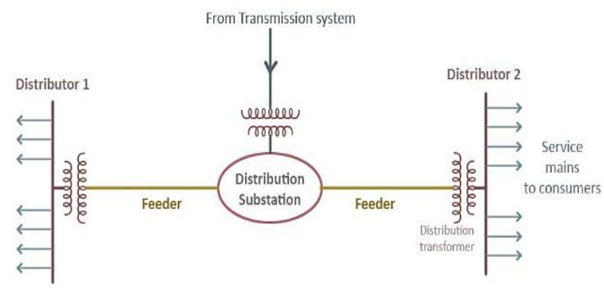

Figure 1: Simple radial AC power distribution system [13]

The distribution transformers again perform the voltage reduction for its utilization process in distinct areas such as household appliances, lighting, industrial equipment etc. Some of the consumers gets the supply from single (one) transformer through secondary-based distribution lines. The residential and the commercial consumers are linked to secondary distribution lines through the service-drop mechanism. The highly demanding consumer may be linked to primary level of distribution or sub-transmission level on direct basis. The data provided by the World Bank indicates a worldwide study of transmission and distribution losses (annually) that accounts for 8.12% of the transmitted electricity. The loss of transmission and distribution for Haiti carries 55.39% loss which created a huge impact on the financial status of the country including the overall efficiency and performance of the system [7]. Thus, the major challenge is to deal and focus upon the present researching methods and areas that would effectively utilize the existing technologies and infrastructure with superior planning.

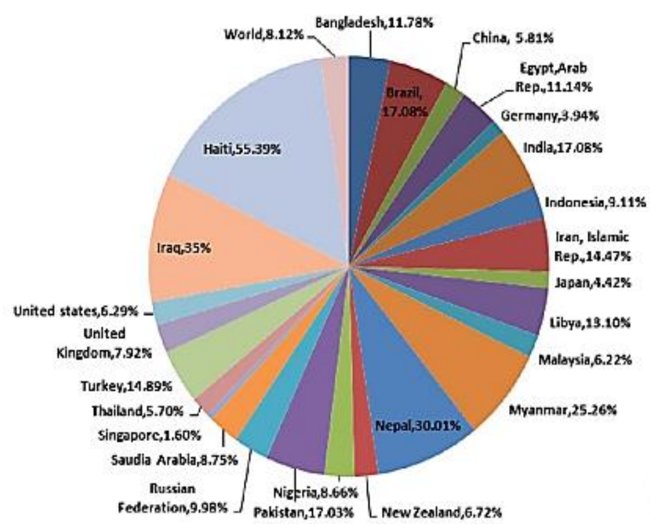

Figure 2: Data Analysis: Transmission and Distribution Losses [11]

1.2 Distribution System: Power Loss Minimization

The one major advantage of distribution system is the process of power loss reduction in the system line. In normal, the power loss based on real power generates more attention for the connected utilities as it is helpful in reducing the transmitted energy efficiency to the consumers. The reactive loss of power is not of greater importance as it is required to be maintained at a specific amount for adequate level of voltage [8, 10]. Hence, the reactive power (Q) enable transfer of the real power (P) through transmission and distribution lines to the consumers. The loss reduction in the system by strategical planning of DG along its network is considered to be very useful if decision analyzer is strictly committed to lower the system losses and to improve the performance of the network i.e. on losses and reliability level, maintenance of low-level reasonable investments. This kind of methodology is very impressive in case recovered revenue by the DISCOs (distribution companies) that not only depend upon the value of assets but also depend upon the performance of the network [9].

1.3 Distribution System: Voltage Profile Improvement

In distribution system, the recommendations by American National Standards Institute (ANSI) {standard C84.1} has specified the voltage variation range lying within -13% to 7%. In practice, various electrical companies, try to control voltage variation within ±6%. The units of DG improve the profile of voltage by transforming the patterns of power flow [12]. The size and location of DGs plays a key role in maintenance of voltage profile. However, in case of medium voltages tie/sectionalizing switches are provided in such a way that the configuration of the network may get altered in order to requirements of operation. The configurational transformation transforms/alters the path of power flow resulting in transformed altered node voltages, degree of unbalances, line currents, and also alters the node voltages distortion level in the presence of harmonics. As the power flow path impedance gets changed because of reconfiguration process, the nodal voltage present in case of voltage sag has the liability to be changed. The problem of tripping of sensitive loads may occur due to process of voltage sag, it is evident that the enhanced voltage sag has the ability to lower the system loss under the condition of voltage sag. The change of nodal voltage harmonic content is resulted by the change in mutually induced voltage and power flow path effective impedance due to transformation in current distribution line.

1.4 Distribution System: Network Configuration

The distribution-based network configuration involves the following points:

(a) Branch exchanges for loss minimization: The minimized-power loss configuration is basically obtained where there occurs optimum flow pattern with the process of exchanging branch operations. The open tie switch at its normal operation is usually closed for loop formation. The power flow pattern on optimum basis is identified by solving KVL and KCL loop equations, where

(b) Branch exchanges for minimized voltage unbalances: The identification of maximum voltage unbalance occurs at its node and the selection of tie-line takes place where the closing of tie-switch results in loop formation including the node identification. The voltages modified at its node in the loop are evaluated and the power flows are determined through the loop branches. The line having minimum power flow is chosen to be in open form such that nodal voltages are disturbed minimally. This kind of procedure helps in reduction of voltage unbalance due to loop formation; the redistribution of current flow takes place.

(c) Branch exchanges for compounded problem: The compounded form of reconfiguration problem seeks to simultaneously satisfy all the tasks. Thus, the procedure of minimizing single task is avoided. The priority is allotted to the task that depends upon its values and its importance in the network prevailed configuration. The loss of power is a critical issue as it carries money wastage repeatedly, so it is called as the highest priority. The main effort is the attempt for system losses reduction.

1.5 Operational Constraints

The multi-objective function (MOF) is reduced/minimized to certain operating constraints in order to fulfil the requirements for the distribution network operation.

(a) Load Balance Constraints: The load regulations of each bus should be satisfied as follows:

$$P_{gni} - P_{dni} - V_{ni} \sum_{j=1}^{N} V_{nj} Y_{nj} \cos(\delta_{ni} - \delta_{nj} - \theta_{nj}) = 0 \dots\dots\dots\dots 1\ (a)$$

$$Q_{gni} - Q_{dni} - V_{ni} \sum_{j=1}^{N} V_{nj} Y_{nj} \sin(\delta_{ni} - \delta_{nj} - \theta_{nj}) = 0 \dots\dots\dots\dots 1(b)$$

Where,

$n_i = 1,2,\dots,n_n$

(b) Power Generation Limit: This involves the lower and the upper generation limits of real and reactive sources at a given bus i

$$P_{gi}^{min} \leq P_{gi} \leq P_{gi}^{max}, i = 1,2,\dots\dots, N_g \dots\dots\dots\dots 2(a)$$

$$Q_{gi}^{min} \leq Q \leq Q_{gi}^{max}, i = 1,2,\dots\dots, N_g \dots\dots\dots\dots 2\ (b)$$

Where,

P_{gi}^{min} *and* P_{gi}^{max} = generation limits based on real powers

P_{gi}^{min} *and* P_{gi}^{max} = generation limits based on reactive powers

(c)Voltage Limit: This limit involves the lower and the upper limits of the magnitude i.e. V_i^{min} *and* V_i^{max} at bus-i. In reality the voltage of the generator includes the voltage of the bus/load in addition to line impedance and the line-based power flow. The voltage should be kept within standards maintained as:

$$V_i^{min} \leq V_i \leq V_i^{max}, i = 1,2,\dots\dots, N_b \dots\dots\dots\dots (3)$$

Where,

V_i^{min} *and* V_i^{max}= min and max voltage limits

II. RELATED WORK

Carmen LT, et.al [1] presented an article with a methodology to evaluate the DG unit installation impacts on the system reliability, electric losses, and the system's voltage profile in distributed networks. The voltage profile and losses were evaluated based on the method of power flow along with generator representation in the form of PV buses. The evaluation based on the reliability indices relied on analytic methods that was modified to handle or safeguard multiple generation. This type of methodology was used to evaluate DG capacity influence on the system performance for distinct type of generation-based expansion with planned alternatives. Ha, Le Thu, et.al [2] explored the study considering the integrating possibility of two large wind farms into a sub-transmission network. It also analysed the impacts on the voltage stability and network losses considering the impacts when there was an increase in network loading of the system. The study was carried with the help of computer analyses performed on custom-designed radial type of power system. U. Eminoglu, et.al [3] presented a voltage stability index for identification of voltage collapse attractive sensitive bus in distribution system (radial). The index developed was based on transformed active and reactive power line distribution. The analysis of the index was tested distinct operating conditions of load and voltage levels of sub-station. The results suggested that the index proposed was of reliable nature which was easily applicable to the radial type network distribution. Wenzhong Gao., et.al [4] presented an approach based on multi-objective optimization methodology for determining distributed generators optimized location in electricity market with deregulated environment as the optimized location of DGs is considered as the most suitable panel or zone which has been identified based on the variations of real and reactive power flow sensitivity variations. Alonso, M, et.al [5] presented a methodology for DG unit's optimal placements in the power networks to assure the maximum load-ability conditions, voltage profile. This type of strategy aims to find system-based components configuration meeting the required system reliability considering the limits of stability. The study indicates that the formulations proposed have shown the best way to find out the best buses where the distributed generator units (additionally) enhance the voltage stability and the capability of power transfer under certain contingencies. Viswanadh, M. M. G., et.al [6] studied an Optimization technique using Particle Swarm Optimization and an analytical approach used to determine the size of the wind generator and its placement optimally. A backward forward sweep load flow conventional method was used for the calculation purpose. The results obtained from two of the approaches were compared and voltage profile of different buses such as 69-bus, 13-bus and 33-bus in the distribution network was obtained. Q. S. Chua, et.al [7] considered the real time system implementation methods of monitoring that was able to provide power system-based time warning before the occurrence of voltage collapse. In this work, different types of line voltage stability indices (LVSI) have been differentiated to overcome the effectuality which determines the power system weakest lines. The LVSI have been accessed using IEEE 14-Bus and IEEE 9-Bus system for practicability validation. This paper work also contributed real-time voltage stability monitoring implementation using Artificial Neural Network (ANN). The results demonstrated the indices evaluation using ANN methodology for predicting the system-based voltage collapse. Yalisho Girma Loaena [8] provided a deep study on the issues related to power system like distribution system based on energy loss and its reduction techniques, reactive power flow along with its compensation, indicators of voltage quality such as regulation of voltage and voltage unbalance. In order to achieve the tasks, the existing form of distribution system based on study site has been designed using a Power Factory Software named DIgSILENT and the process of simulation was performed under balancing and unbalancing operating conditions. The measurement using Clamp-on meter was done to find the line to line voltages and the load demand. Patel, J. S., R. R. Patel, et.al [9] conducted a novel approach utilizing generated power with the help of distributed generation in case of primary distribution network such that the DG incorporation installed with capacity reduce the losses occurring in the overall system. The method of DG location and sizing using Genetic Algorithm was presented. A very simple load flow technique for accuracy was described and technique proposed was implied over two of the systems. One is the 2. 69 Bus Distribution System and the other is the IEEE 34 Bus distribution System using a software MATLAB tool. A. V. Sudhakara Reddy, et.al [10] proposed an algorithm popularly known as a Grey Wolf Optimization (GWO) algorithm to overcome the issues related to feeder reconfiguration with the help of fitness function corresponding to power distribution systems based optimized switch combination to overcome the issues related to reconfiguration including the real power loss reduction. Giampaolo Buticchi, et.al [12] proposed two application. One is the smart overload-control which involves the controlling action of the voltage. On the other hand, the the Soft Load Reduction method helps in reduction of load consumed by avoiding the problem of load-disconnection. This type of services basically depends upon voltage with proper load dependency identification mechanism which was evaluated using Smart Transformer in real-time analysis on the on load-based measurements. The distributed generation effect on total load sensitivity has been demonstrated and derived with control hardware In Loop technology by means of a Digital Simulator on real time basis. Shao, Hua, et.al [13] analysed the voltage profile in distribution-based networks for distinct type of installations for DG based on its capacity and location of the DGs. The back/forward sweep method was implemented to the calculation of the load flow and the distribution network simulation was performed along with distributed generation. The proposed method resulted in analysing the impact of DG connection over the voltage profile.

III. THE PROPOSED METHOD

3.1 Proposed Methodology

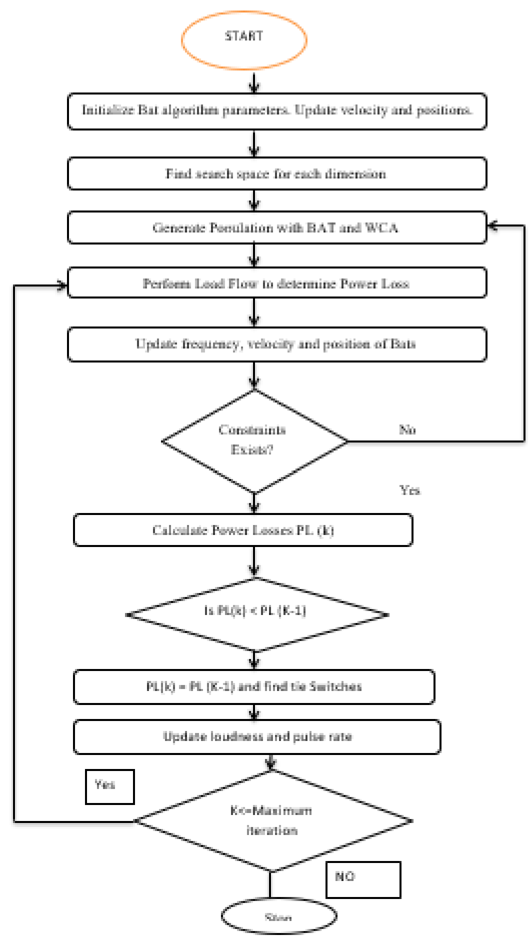

Figure 3: Proposed Flowchart

Methodology Steps:

Step1 : Deploy the wireless Sensor network.
Step2 : Apply the leach routing process.
Step3 : Simulate the black hole attack on the wireless Sensor network and parallel optimize by WCA algorithm.
Step4 : {
Initialize the water cycle optimization

- Generate the initial population
- Calculate the fitness function.

- Find the best solution and update the fitness value.
- Check the objective function
- Check it optimize or not it optimized then analysis the time and dead node otherwise check the counter is greater than 0 or not. If the counter value is less than not converging and ignore the node during routing. Else again initialize the value at WCA.

}

3.2 Algorithm Used

Water Cycle Optimization (WCA): Water cycle optimization is a nature inspired algorithm which based on the concept of river and streams flow in the sea. This algorithm is mainly used for the computation optimization and applicable of the different graph, tress and unstructured data. This algorithm is able to compute the maximum and minimum value of the function. Water cycle algorithm works on the user defined fixed variable and it address a large number of optimization problem. In the initial phase of the WCA algorithm design variables are randomly generated after the raining process. The best variables selected on the basis of minimum cost function. The initial population of the optimization algorithm is in the form of matrix and dimension

IV. RESULT ANALYSIS

4.1 Result Analysis

Table 1: Voltage magnitude comparison on Load 100 and 110 in different approaches

WCA(100)	BAT(100)	Pso(100)	BAT-WCA(100)	WCA(110)	BAT(110)	Pso(110)	BAT-WCA(110)
1.1	1.09	1.3	1.54	1.1	1.198333	1.1	1.4096667
1.09	1.076667	1.2	1.47	1.099	1.194667	1.099	1.423
1.08	1.06	1.1	1.43	1.096	1.189	1.13	1.4233333
1.06	1.023333	1.09	1.41333333	1.089	1.19	1.14	1.4166667
1.04	0.99	1.08	1.39666667	1.082	1.193667	1.1	1.4366667
0.97	0.956667	1.05	1.36666667	1.099	1.159667	1.11	1.4
0.96	0.94	1.04	1.34333333	1.1	1.116667	1.2	1.36
0.94	0.923333	0.99	1.31	0.98	1.07	0.99	1.2866667
0.92	0.903333	0.98	1.28	0.97	1.056667	0.99	1.29
0.91	0.88	0.94	1.24	0.96	1.053333	0.98	1.2866667
0.88	0.85	0.9	1.21666667	0.94	1.056667	1	1.29
0.85	0.816667	0.86	1.19	0.96	1.07	0.98	1.2833333
0.82	0.79	0.87	1.17	0.97	1.05	0.99	1.2866667
0.78	0.77	0.82	1.14	0.98	1.03	0.98	1.27
0.77	0.76	0.8	1.13333333	0.9	1	0.99	1.2433333
0.76	0.766667	0.78	1.13666667	0.91	0.993333	0.94	1.2266667
0.75	0.78	0.8	1.15	0.89	0.973333	0.9	1.24
0.79	0.803333	0.81	1.16666667	0.88	0.963333	0.94	1.2366667
0.8	0.82	0.82	1.18333333	0.85	0.966667	0.98	1.2233333
0.82	0.816667	0.85	1.18333333	0.86	0.946667	0.89	1.1766667
0.84	0.803333	0.86	1.16666667	0.89	0.92	0.9	1.1633333
0.79	0.776667	0.82	1.14333333	0.79	0.876667	0.84	1.1533333
0.78	0.77	0.8	1.13	0.78	0.87	0.85	1.1666667
0.76	0.776667	0.79	1.14	0.76	0.876667	0.87	1.16
0.77	0.8	0.78	1.16	0.77	0.9	0.88	1.1666667
0.8	0.816667	0.83	1.17666667	0.8	0.916667	0.83	1.1733333
0.83	0.82	0.85	1.18	0.83	0.92	0.89	1.2066667
0.82	0.81	0.83	1.17333333	0.82	0.91	0.9	1.21
0.81	0.805	0.84	1.175	0.81	0.905	0.93	1.215
0.8	0.8	0.83	1.17	0.8	0.9	0.9	1.2
1.09	1.075556	1.2	1.48	1.098333333	1.194	1.109666667	1.418666667
1.076667	1.053333	1.13	1.437777777	1.094666667	1.191222	1.123	1.421
1.06	1.024444	1.09	1.413333333	1.089	1.190889	1.123333333	1.425555567
1.023333	0.99	1.073333	1.392222223	1.09	1.181111	1.116666667	1.4177778
0.99	0.962222	1.056667	1.36888889	1.093666667	1.156667	1.136666667	1.3988889
0.956667	0.94	1.026667	1.34	1.059666667	1.115444	1.1	1.3488889
0.94	0.922222	1.003333	1.31111111	1.016666667	1.081111	1.06	1.312222233
0.923333	0.902222	0.97	1.276666667	0.97	1.06	0.986666667	1.2877778
0.903333	0.877778	0.94	1.245555557	0.956666667	1.055556	0.99	1.2888889

0.88	0.848889	0.9	1.215555557	0.953333333	1.06	0.986666667	1.286666667
0.85	0.818889	0.876667	1.192222223	0.956666667	1.058889	0.99	1.286666667
0.816667	0.792222	0.85	1.166666667	0.97	1.05	0.983333333	1.28
0.79	0.773333	0.83	1.147777777	0.95	1.026667	0.986666667	1.266666667
0.77	0.765556	0.8	1.136666667	0.93	1.007778	0.97	1.246666667
0.76	0.768889	0.793333	1.14	0.9	0.988889	0.943333333	1.236666667
0.766667	0.783333	0.796667	1.151111113	0.893333333	0.976667	0.926666667	1.234444467
0.78	0.801111	0.81	1.166666667	0.873333333	0.967778	0.94	1.233333333
0.803333	0.813333	0.826667	1.177777777	0.863333333	0.958889	0.936666667	1.212222233
0.82	0.813333	0.843333	1.177777777	0.866666667	0.944444	0.923333333	1.187777767
0.816667	0.798889	0.843333	1.164444443	0.846666667	0.914444	0.876666667	1.164444433
0.803333	0.783333	0.826667	1.146666667	0.82	0.888889	0.863333333	1.1611111
0.776667	0.774444	0.803333	1.137777777	0.776666667	0.874444	0.853333333	1.16
0.77	0.782222	0.79	1.143333333	0.77	0.882222	0.866666667	1.164444467
0.776667	0.797778	0.8	1.15888889	0.776666667	0.897778	0.86	1.166666667
0.8	0.812222	0.82	1.172222223	0.8	0.912222	0.866666667	1.182222233
0.816667	0.815556	0.836667	1.176666667	0.816666667	0.915556	0.873333333	1.196666667
0.82	0.811667	0.84	1.17611111	0.82	0.911667	0.906666667	1.210555567
0.81	0.805	0.833333	1.172777777	0.81	0.905	0.91	1.208333333
0.9	0.893519	0.956667	1.275	0.902777778	0.999667	0.979888889	1.277888889
0.988889	0.976296	1.053333	1.362592592	0.997666667	1.095074	1.044222222	1.346555556
1.075556	1.051111	1.14	1.443703703	1.094	1.192037	1.118666667	1.421740744
1.053333	1.022593	1.097778	1.414444444	1.091222222	1.187741	1.121	1.421444456
1.024444	0.992222	1.073333	1.391481482	1.090888889	1.176222	1.125555556	1.414074089
0.99	0.964074	1.052222	1.367037038	1.081111111	1.151074	1.117777778	1.388518533
0.962222	0.941481	1.028889	1.34	1.056666667	1.117741	1.098888889	1.353333344
0.94	0.921481	1	1.309259259	1.015444444	1.085519	1.048888889	1.316296311
0.922222	0.900741	0.971111	1.277777778	0.981111111	1.065556	1.012222222	1.296296311
0.902222	0.876296	0.936667	1.245925927	0.96	1.058519	0.987777778	1.287777789
0.877778	0.848519	0.905556	1.217777779	0.955555556	1.058148	0.988888889	1.287407411

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0.96	0.94	1.04	1.34333333	1.1	1.1166667	1.2	1.36
0.94	0.92333333	0.99	1.31	0.98	1.07	0.99	1.2866667
0.92	0.90333333	0.98	1.28	0.97	1.0566667	0.99	1.29
0.91	0.88	0.94	1.24	0.96	1.0533333	0.98	1.2866667
0.88	0.85	0.9	1.21666667	0.94	1.0566667	1	1.29
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0.77	0.76	0.8	1.13333333	0.9	1	0.99	1.2433333
0.76	0.76666667	0.78	1.13666667	0.91	0.9933333	0.94	1.2266667
0.75	0.78	0.8	1.15	0.89	0.9733333	0.9	1.24

0.79	0.80333333	0.81	1.16666667	0.88	0.9633333	0.94	1.2366667
0.8	0.82	0.82	1.18333333	0.85	0.9666667	0.98	1.2233333
0.82	0.81666667	0.85	1.18333333	0.86	0.9466667	0.89	1.1766667
0.84	0.80333333	0.86	1.16666667	0.89	0.92	0.9	1.1633333
0.79	0.77666667	0.82	1.14333333	0.79	0.8766667	0.84	1.1533333
0.78	0.77	0.8	1.13	0.78	0.87	0.85	1.1666667
0.76	0.77666667	0.79	1.14	0.76	0.8766667	0.87	1.16
0.77	0.8	0.78	1.16	0.77	0.9	0.88	1.1666667
0.8	0.81666667	0.83	1.17666667	0.8	0.9166667	0.83	1.1733333
0.83	0.82	0.85	1.18	0.83	0.92	0.89	1.2066667
0.82	0.81	0.83	1.17333333	0.82	0.91	0.9	1.21
0.81	0.805	0.84	1.175	0.81	0.905	0.93	1.215
0.8	0.8	0.83	1.17	0.8	0.9	0.9	1.2
1.09	1.075555557	1.2	1.48	1.098333333	1.194	1.109666667	1.418666667
1.076666667	1.053333333	1.13	1.437777777	1.094666667	1.191222233	1.123	1.421
1.06	1.024444443	1.09	1.413333333	1.089	1.1908889	1.123333333	1.425555567

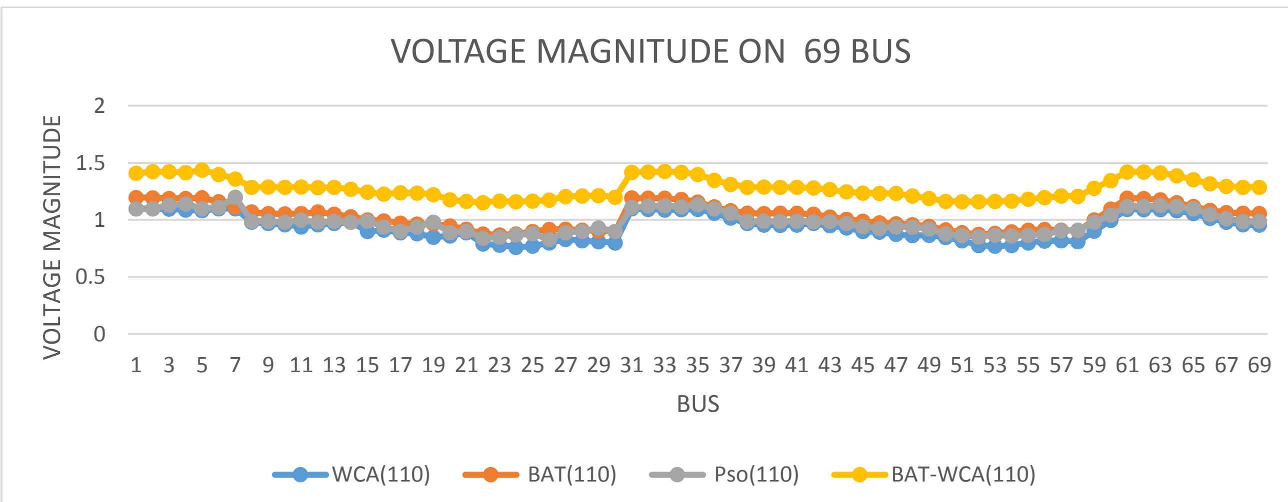

Figure 5: Analysis of distributed transmission on 69 bus system on load 110

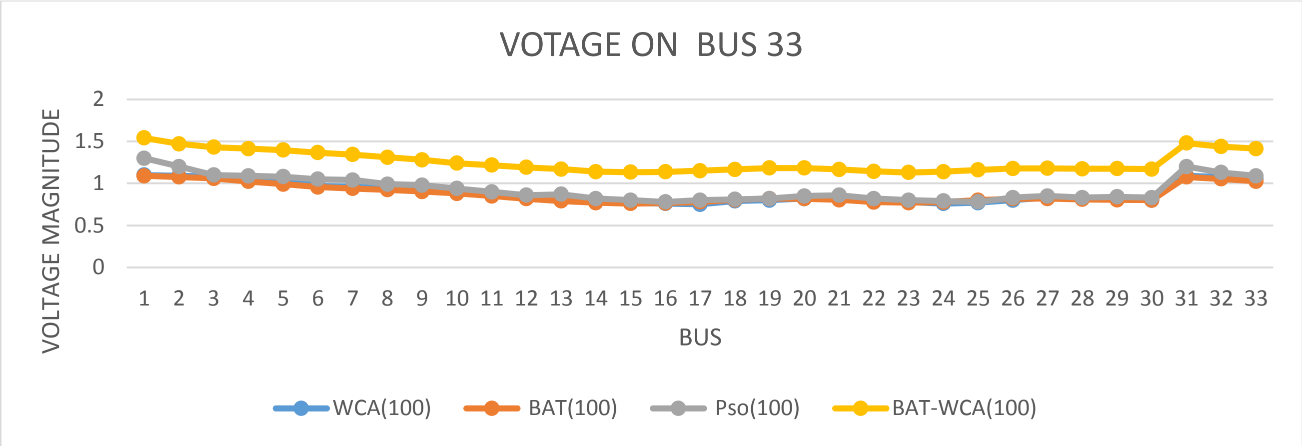

Figure 6: Analysis of distributed transmission on 33 bus system on load 100

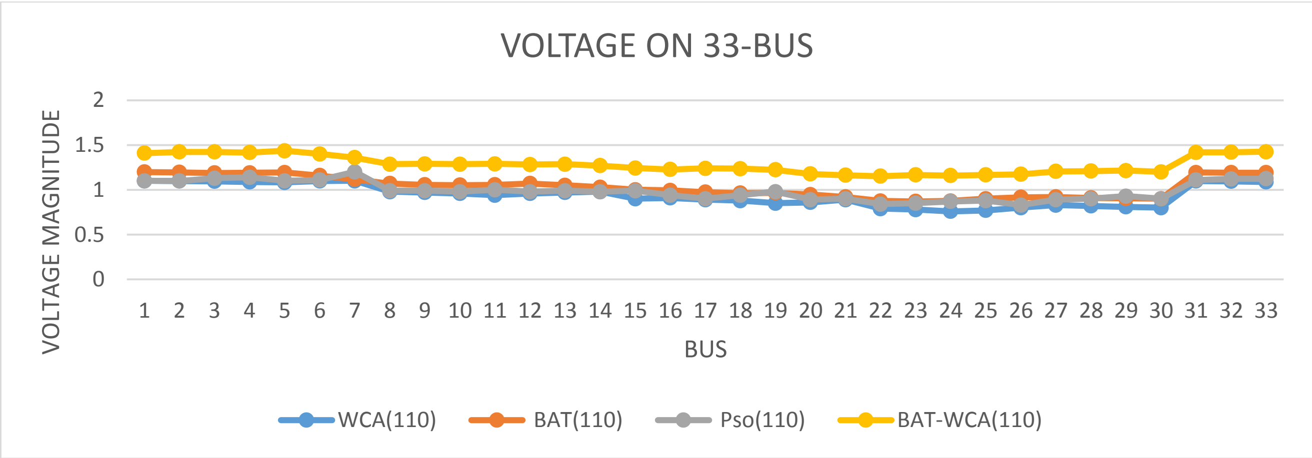

Figure 7: Analysis of distributed transmission on 33 bus system on load 110

Table. 3: Losses on different buses by different approaches

BUS	LOSSES(Mw)(WCA)	LOSSES(Mw)(BAT)	LOSSES(Mw)(PSO)	LOSSES(Mw)(BAT-WCA)
33-BUS	23.23	21.23	22	17.45
69-BUS	32.34	30.23	31.23	27.44

Table 4: Coston different buses by different approaches

BUS	COST(RS)(WCA)	COST(RS)(BAT)	COST(RS)(PSO)	COST(RS)(BAT-WCA)
33-BUS	10000	9000	9345	7054
69-BUS	12000	11000	11234	8044

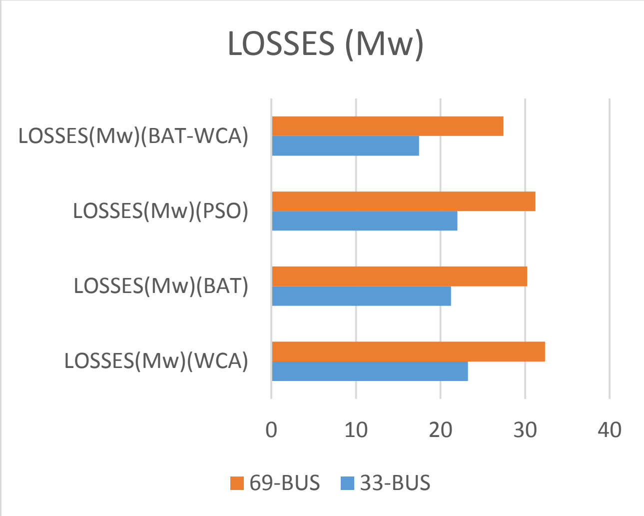

Figure 8: Losses on different buses by different approaches

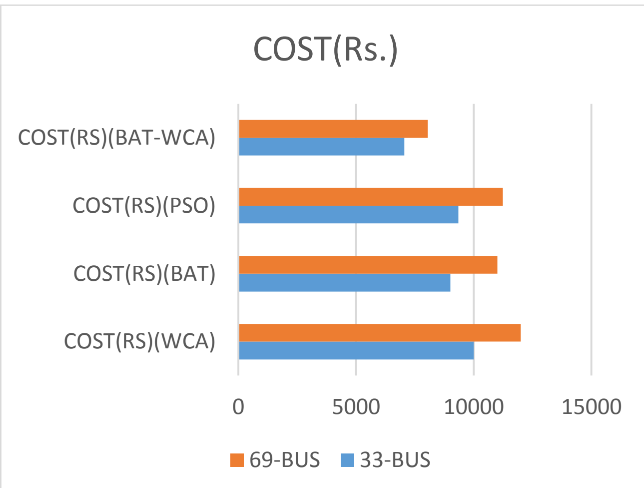

Figure 9: Losses on different buses by different approaches

IV CONCLUSION

This research study based on the Maximum interchange Capability and Maximum Supply Capacity in the context of optimal load flows. It formulates the problems in linear programs by using incremental network models. The advantages of linear programming motivate to solve the problem by optimization concept in power system operation. In this work maximum interchange capability problem was undertaken first to solve. There are two primary reasons to reconfigure a distribution network during normal operation. Depending on the current loading conditions, reconfiguration may become necessary in order to eliminate overloads on specific system components such as transformers or line sections. In this case it is known as load balancing. The gradient and BAT methods and Hybrid BAT with (grey wolf optimization) GWO of solving In result show the percentage of loss all distribution of power in configured, BAT and GWO_BAT approach using different bus system like 33 and 36 bus system in proposed approach show the significance improve by 37% and 38.23% but only BAT algorithm 33% and 34% because it's not optimize using only local transmission which not able global optimization.

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