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MULTI OBJECTIVE FDR PARTICLE SWARM ALGORITHM FOR NETWORK RECONFIGURATION OF DISTRIBUTION SYSTEMS

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ABSTRACT

This paper proposes a novel particle swarm optimization algorithm for Multi-Objective reconfiguration of distribution system named Multi-Objective Fitness Distance Ratio Particle Swarm Optimization Algorithm (MOFDR-PSOA) for minimization of power loss, voltage drop and to maintain better thermal limits of feeders with respect to their loading capabilities. In Conventional PSO all the solutions damps towards local pbest and thoroughly ignore other pbest points due to the convergence criteria and targets mainly on local optima than global optima. The proposed MOFDR-PSOA in contrast, considers local pbest points as well as neighbouring pbest values before arriving to gbest. This method thoroughly avoids premature convergence as well as convergence towards global optima. The effectiveness of the proposed method is demonstrated through IEEE 16 and 32 bus standard test systems.

Keywords- *MOFDR-PSO, Reconfiguration, Distribution Systems, Power loss*

1. .INTRODUCTION

Distribution system reconfiguration has been under study for quite some time now. This is because of the losses caused in the distribution system. Most the distribution systems are in radial configuration. A Radial distribution system is a combination of Sectionalizing switches (Closed) and Tie switches (Open). By performing switching actions, we can alter the topology of the network and obtain the best possible configuration. The switching action depends on the number of switches, the greater the number of switches, more are the possibilities of reconfiguration. To minimize the number of switching actions, we incorporate heuristic rules. In recent years, considerable research has been conducted for loss minimization in the area of network reconfiguration of distribution systems. Many researchers advocate the use of combination of heuristics and optimization techniques. The combination of these two techniques allows the problem to maintain a certain level of accuracy and assures convergence with an acceptable solution time. Distribution system reconfiguration for loss reduction was first proposed by Merlin and Back [1]. They have used a branch-and-bound-type optimization technique to determine the minimum loss configuration. In this method, all network switches are first closed to form a meshed network. The switches are then opened successively to restore radial configuration. Based on the method of Merlin and Back [1], in paper by S. Civanlar, J. J. Grainger and S. H. Lee [2], development of a branch-exchange method which considers the on-off conditions of the sectionalizing switches in discrete numbers was done [2]. Since the method is based on heuristics, it is not so easy to take a systematic way to evaluate an optimal solution. Based on the method of Merlin and Back [1], a heuristic algorithm has been suggested by Shirmohammadi and Hong [3]. Here also, the solution procedure starts by closing all of the network switches which are then opened one after another so as to establish the optimum flow pattern in the network. Two different methods with changing levels of accuracy to approximate power flow in systems were proposed by M. E. Baran and F. F. Wu [4]. The method of searching has convergence criteria within acceptable limits. However, it can be confined to local minimum.

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The method would consume lot of time due to its complicated combinations in large-scale systems. Many approximations from the method of Merlin and Back have been overcome in this algorithm. Borozan *et al.* [5] have presented approximations from the method of Merlin and Back. Borozan *et al.* [5] have also presented a network reconfiguration technique similar to that of Shirmohammadi and Hong [3]. An expert system for feeder reconfiguration, based upon extensions of the rules in [2] was presented by T. Taylor and D. Lubkeman in [6], which had a potential of handling realistic operating constrains. The method taken was to set up a decision tree which would represent various switching operations. Based on partitioning the distribution network into groups of load buses, the line section losses between the groups of nodes are minimized in the paper by R. J. Sarfi, M. M. A. Salama and A. Y. Chikhani [7]. The bus groups are formed to divide the distribution system and the reconfiguration problem with combinatorial nature is overcome, while simultaneously losses are minimized. To obtain global optimal or, at least near global optimal solutions, Chiang and Jean-Jumean [8] and Jeon *et al.* [9] have proposed new solution methodologies using the simulated annealing algorithm for the reconfiguration. Wagner *et al.* [10] have presented a comparison of various methods applied to feeder reconfiguration for loss reduction and they have suggested that heuristic approaches can provide substantial savings and suitable for real-time implementation. Zhou *et al.* [11] have proposed two feeder reconfiguration algorithms for the purpose of service restoration and load balancing. Their methodologies combined the optimization techniques with heuristic rules and fuzzy logic for efficiency and robust performance. Taleski and Rajicic [12] have proposed a method to determine the configuration with minimum energy losses for a given period. Augugliaro *et al.* [13] have proposed artificial-intelligence-based applications in a minimum loss reconfiguration. Taleski and Rajicic [14] have proposed a method to determine the configuration with minimum energy losses for a given period. A new method for checking system radiality which is based on upward-node expression, which has been developed for solving the problem of restorative planning of power system, was proposed. A paper by Young-Jae Jeon and Jae-Chul Kim [15], proposes an efficient hybrid algorithm of SA and TS method for feeder reconfiguration which improves the computation time and convergence property. In [16] authors S. F. Mekhamer, A. Y. Abdelaziz, F. M. Mohammed and M. A. L. Badr have proposed a modified tabu search (MTS) based method for reconfiguration of distribution systems. The TS algorithm was introduced with some modifications such as using a tabu-list using variable size to prevent cycling and to escape from local minimum. Also, it used a constrained multiplicative move in the search process to diversify the search process toward regions which were unexplored. In the literature, it has been proved that the particle positions in PSO oscillate in damped sinusoidal waves until they converge to points in between their previous *pBest* and *gBest* positions as defined in [17] by J. Kennedy and R. Eberhart, which prevent the particles from effective search for the global optimum. To overcome the above problem, a new FDR-PSOA is presented in this paper. The FDR-PSOA algorithm, in addition to the Socio-cognitive learning processes, each particle also learns from the experience of neighbouring particles that have a better fitness than itself in a paper by T. Peram, K. Veeramacheneni and C. K. Mohan [18]. The details of this algorithm are discussed in further sections. This paper proposes an improved PSO algorithm for distribution system reconfiguration with a new variable expression design which overcomes the drawbacks faced in the previous methods.

Remaining part of the paper is organized as follows: Section-II presents the problem formulation, Section-III presents proposed MOFDR-PSOA, Section-IV presents Simulation Results and Section-V presents Conclusion.

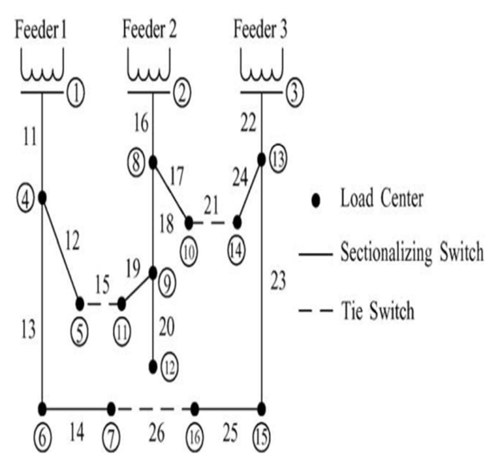

Fig.1 IEEE 16 BUS System

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2. PROBLEM FORMULATION

Distribution system consists of two types of switches: tie switch and sectionalizing switch. As shown in Fig.1, the branches between nodes 5-11, 10-14, 7-16 are the tie switches which are open and the remaining continuous switches are called sectionalising switches which are generally closed. When operating conditions are abnormal or undergo a change, reconfiguration of the system is performed during which, one of the tie switch is closed and a part of the load is transferred to another feeder and to maintain the radiality, simultaneously a sectionalized switch must be opened. For example if the network is reconfigured and the tie switch closed is the one between 5-11, then to maintain radiality say switch between 4-5 is opened.

The main objective of the reconfiguration of distribution system is to minimize the losses with control of sectionalizing switches. The reconfiguration problem has the following constrains:

Constrains

1. Power flow equations.
2. Upper and lower bounds of nodal voltages.
3. Upper and lower bounds of line currents.
4. Feasible conditions in terms of network topology.

Mathematically, the problem can be formulated as follows:

Cost function:

$$MinZ = \frac{\sum_{i=1}^{L} r_i (P_i^2 + Q_i^2)}{V_i^2} \qquad (1)$$

Subject to:

$$g(x) = 0 \qquad (2)$$

$$V_i^{min} < V_i < V_i^{max} \qquad (3)$$

$$I_i^{min} < I_i < I_i^{max} \qquad (4)$$

$$\det(A) = 1 \text{ or } -1 \text{ radial system} \qquad (5)$$

$$\det(A) = 0 \text{ not radial} \qquad (6)$$

Where,
Z: Cost function
L: No. of transmission lines
P_i: Active power loss at bus *i*
Q_i: Reactive power at bus *i*
V_i: Voltage at bus *i*
I_i: Line current at line *i*
g(x):Power flow equations
V_i^{min} : Lower voltage limit
V_i^{max} : Upper voltage limit
I_i^{min} : Lower current limit
I_i^{max} : Upper current limit
A: Bus incidence matrix
r_i : Section resistance

3. PROPOSED MULTI-OBJECTIVE FITNESS DISTANCE RATIO PARTICLE SWARM OPTIMIZATION ALGORITHM (MOFDR-PSOA)

Particle swarm optimization (PSO) is one of the evolutionary computation techniques. Like the other evolutionary computation techniques, PSO is a population- based search algorithm and is initialized with a population of random solutions, called particles. PSO is based on a simplified social model that is closely tied to swarming theory and was first introduced by Kennedy and Eberhart in 1995. This concept consists of, at each generation, changing the velocity and location of each particle toward its *pBest* location depending on memory and *gBest* location depending on knowledge according to (7) and (8), respectively.

$$V_i^{k+1} = wV_i^k + c_1 * rand_1(\dots) * \left(\frac{pbest_i - s_i^k}{\Delta t}\right) + c_2 rand_2(\dots) * \left(\frac{gbest_i - s_i^k}{\Delta t}\right) \qquad (7)$$

$$s_i^{k+1} = s_i^k + v_i^{k+1} * \Delta t \qquad (8)$$

There are three problem-dependent parameters, the inertia weight of the particle (w), and two parameters (C1 and C2). In the Conventional PSO (CPSO), each particle learns from its own experience and the experience of the most successful particle (Social and Cognitive learning processes). In the literature, it has been proved that the particle positions in CPSO oscillate in damped sinusoidal waves until they converge to points in between their previous *pBest* and *gBest* positions. During this oscillation, if a particle reaches a point which has better fitness than its previous best position, then the particle continues to move towards the convergence of the global best position discovered so far. All the particles follow the same behaviour to converge quickly to a good local optimum of the problem. Suppose, if the global optimum of the problem does not lie on a path between original particle positions and such a local optimum, then the particle is prevented from

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effective search for the global optimum. In such cases, many of the particles are wasting their Better results may be obtained if various particles explore other possible search directions.
This paper considers *three main objectives* for the problem of reconfiguration :

- Power loss
- Node Voltage Deviation
- Feeder Currents

An expression is defined which includes all the three objectives.

In the proposed MOFDR-PSOA algorithm, in addition to the Socio-cognitive learning processes, each particle also learns from the experience of neighbouring particles that have a better fitness than itself. This approach results in change in the velocity update equation, although the position update equation remains unchanged. This algorithm outperforms CPSO and many of the recent improvements of the PSO algorithm on many benchmark problems, being less susceptible to premature convergence. It selects only one other particle at a time when updating each velocity dimension and that particle is chosen to satisfy the following two criteria:
1. It must be near the current particle.
2. It should have visited a position of higher fitness.

First Objective: Power Loss

Power loss reduction is one of the most basic and fundamental objective in reconfiguration of any distribution system. Power Loss in the best reconfigured state minimum. In this paper, power loss is taken as one of the variables and is named as 'x' and is multiplied with a constant 'a' for determining its priority.

Second Objective: Node Voltage Deviation

Node Voltage Deviation is another important objective in reconfiguration of distribution system. For any system to be in the best possible configuration, Node Voltage Deviation should be as minimum as possible. In this paper, Node Voltage Deviation is taken as one of the variables and is named as 'y' and is multiplied with a constant 'b' for determining its priority.

Third Objective: Feeder Currents

Feeder Currents is yet another important objective in reconfiguration of distribution system. The currents carried by different feeders in the system should be uniform if not close to uniform to avoid over loading of other feeders which may lead to collapse of the complete system. In this paper, Feeder Current is taken as one of the variables and is named as 'z' and is multiplied with a constant 'c' for determining its priority.

computational effort in seeking to move towards the local optimum already discovered.

Thus the equation which consists of all the three objectives becomes

$$P=ax+by+cz \qquad (9)$$

In this paper all the objectives have been given equal priority and thus a=b=c=1 and equation 9 is taken to calculate the fitness.

In the MOFDR-PSOA algorithm, the particle's velocity update is influenced by the following three stages:
Stage-1: Previous best experience i.e. *pBest* of the particle.
Stage-2: Best global experience i.e. *gBest*, considering the best *P best* of all particles.
Stage-3: Previous best experience of the "best nearest" neighbour i.e. *nBest*.
Hence, the new velocity update equation becomes:

$$V_i^{k+1}=w*v+c_1*rand()*(pbest_i-present)+c_2*rand()*(gbest_i-present)+c_3*rand()*(nbest-present) \qquad (10)$$

MOFDR-PSOA Algorithm

Step: 1 Input Data and Initialize particles with random position and velocity vectors.
Step: 2 for each particle evaluate fitness p.
Step: 3 Compare P with local Pbest, if P greater than Pbest, then make Pbest=P.
Step: 4 repeat the above step for all particles.
Step: 5 now set Pbest as Gbest and neighbour Pbest as Nbest.
Step: 6 update the particle velocity and position equations as given in (8) and (10)
Step: 7 repeat the process till itermax count
Step: 8 the gbest obtained is the optimal solution

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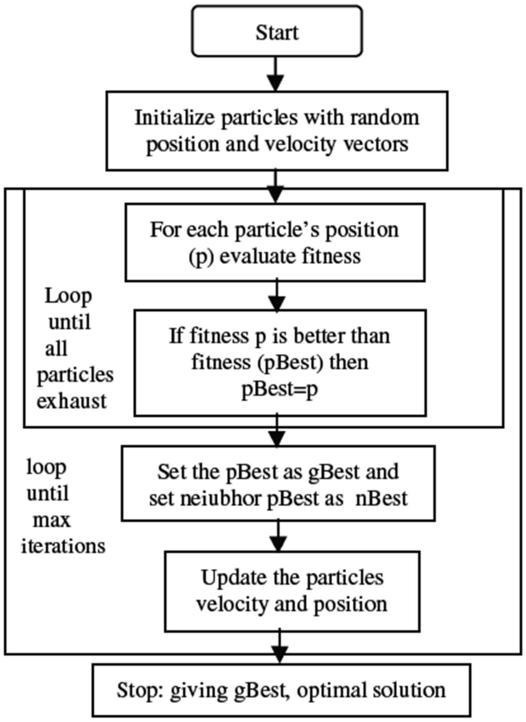

Fig2. Flow chart for the MOFDR-PSOA

IV. SIMULATION RESULTS

Standard IEEE 16 and 32 bus systems are considered to test the effectiveness of the proposed MOFDR-PSOA. Case-1 considers IEEE 16 Bus system and Case-2 Considers IEEE 32 Bus system. MATLAB 7 version on INTEL CORE 2 DUO 2G, 2.5 GHZ processor is used for simulation studies.

Case-1: IEEE 16 Bus system

The IEEE 16 Bus System is shown in Fig.3. It has 16 nodes, 26 Switches of which 3 are Tie-Switches and remaining are Sectionalizing switches.

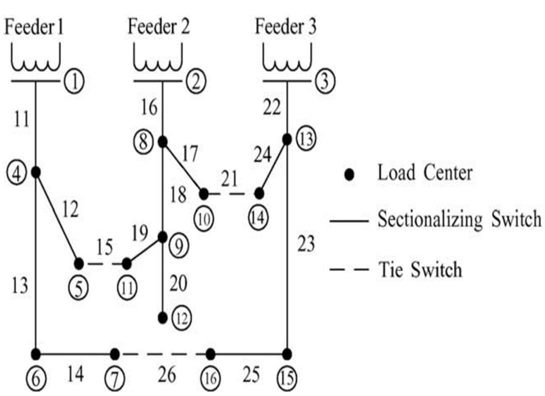

Fig3: Before reconfiguration

The system in Fig.3 represents IEEE 16 Bus system before reconfiguration and Fig.4 represents after reconfiguration. The Real power loss before reconfiguration of switches is 450.11 KW and minimum voltage is 0.932 pu. The power loss after network reconfiguration is 411.4 KW and the minimum voltage improved to 0.940 pu. Fig.3 describes IEEE 16 Bus radial distribution system before reconfiguration. The switches 15, 26 and 21 are Tie switches (Open switches). The losses and voltage deviations are shown in Table-1 and feeder currents before and after reconfiguration are shown in Table-2.

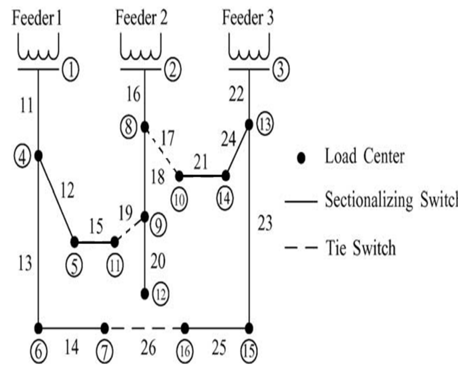

Fig4:After Reconfiguration

Fig.4 describes IEEE 16 Bus radial distribution system after reconfiguration through MOFDR-PSOA algorithm. The switches 17, 19 and 26 are Tie switches (Open switches). The losses and voltage deviations are shown in Table-1 and feeder currents before and after reconfiguration are shown in Table-2.
Table-1 provides MOFDR-PSOA simulation results before and after reconfiguration.

Table-1.Results of 16 Bus system

	Before Reconfiguration	After Reconfiguration
Power Loss(kW)	450.11	411.4
Minimum Voltage	0.932 pu	0.94 pu
Tie Switches	15,21,26	19,17,26

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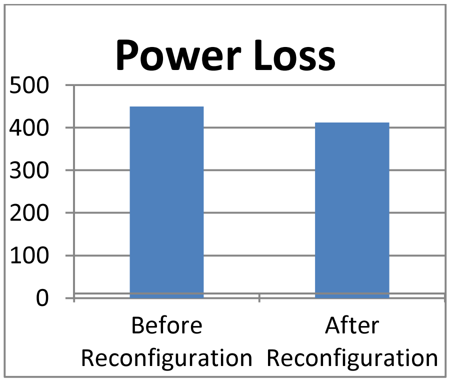

Fig.5.Power loss of 16 Bus system before and After Reconfiguration

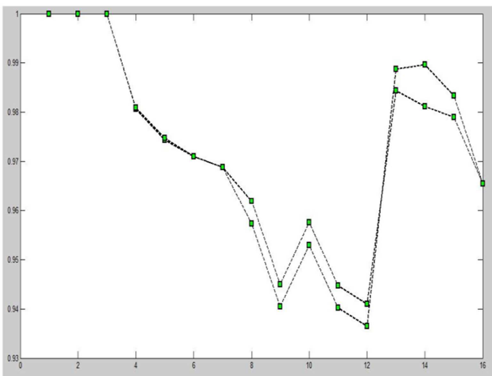

Fig.6 Voltage Variation at Nodes Before and After Reconfiguration

Before reconfiguration the minimum Bus voltage is 0.932 pu and after reconfiguration the minimum Bus voltage 0.94 pu and also it is observed that solution is obtained in less number of iterations.

Table-2 provides feeder currents before reconfiguration and reconfiguration using MOFDR-PSOA algorithm.

Table-2.Feeder Currents

Before Reconfiguration	After Reconfiguration
IF_1=54.112A	IF_1=37.609A
IF_2=18.736A	IF_2=33.191A
IF_3=57.149A	IF_3=37.646A

It can be observed that the feeder currents are evenly distributed amongst all the feeders in proportion to their capabilities. No feeder is stressed heavily or lightly.

Case-2 : IEEE 32 Bus system

The IEEE 32 Bus System is shown in Fig.6. It has 32 nodes, 37 Switches of which 5 are Tie-Switches and remaining are Sectionalizing switches. The system in Fig.7 represents IEEE 32 Bus system before reconfiguration.

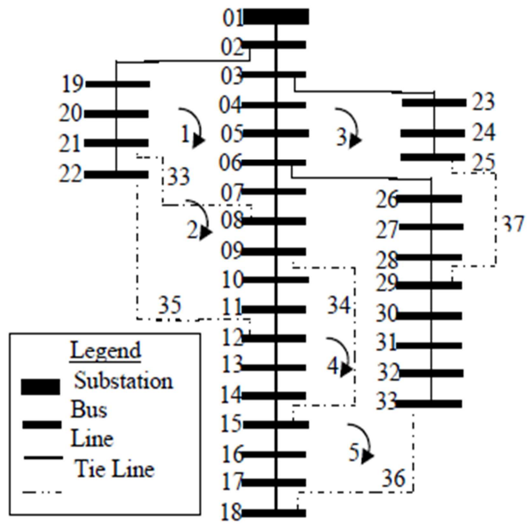

Fig.7.IEEE 32 Distribution Bus system

Fig.7 describes IEEE 32 Bus radial distribution system before reconfiguration. The switches 33, 34, 35, 36, 37 are Tie switches (Open switches).

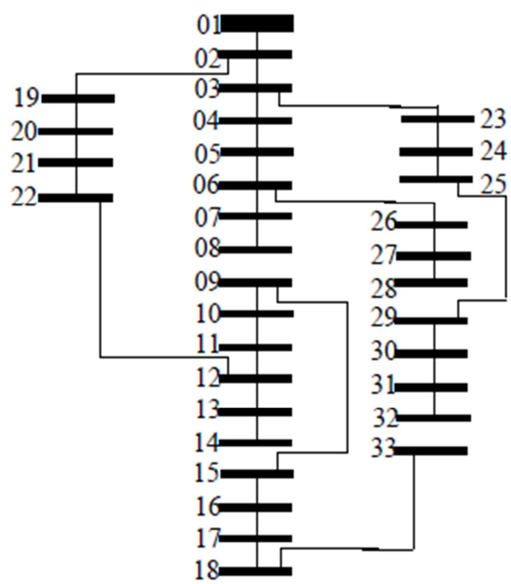

Fig.8.After Reconfiguration

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The losses and voltage deviations are shown nTable-3 and feeder currents before and after reconfiguration are shown in Table-4. Fig.8 represents after reconfiguration.The losses have educed by 8.60% and the time of execution is 1.05 seconds only. The Real power loss before reconfiguration is 205.2 KW and the minimum voltage is 0.91pu.
The power loss after reconfiguration is 137.60 KW and the minimum voltage is 0.94 pu.

Table-3 Results of 32 Bus system

	Before Reconfiguration	After Reconfiguration
Power Loss(kw)	205.2	138.70
Minimum Voltage	0.91	0.945 pu
Tie Switches	33,34,35,36,37	8-21, 14-15, 8-9, 32-33, 28-29

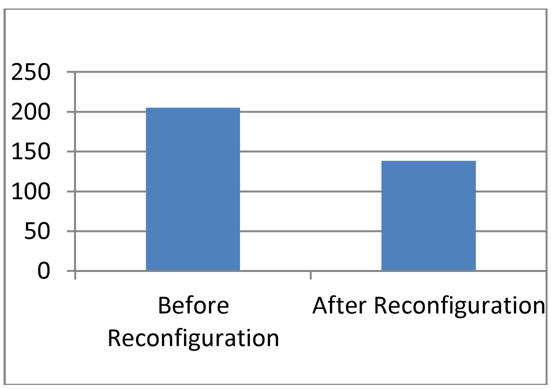

Fig.9. Power loss of 33 Bus system before and After Reconfiguration

The losses have reduced by 32.94% and the time of execution is just 1.2 seconds only. The voltage profile improvement achieved by the proposed MOFDR-PSOA algorithm. As shown, most of the bus voltages have been improved after feeder reconfiguration. The minimum bus voltage was equal to 0.9724 p.u. and after reconfiguration; it is raised to 0.985 p.u. Voltage Variation at Nodes Before and After Reconfiguration.

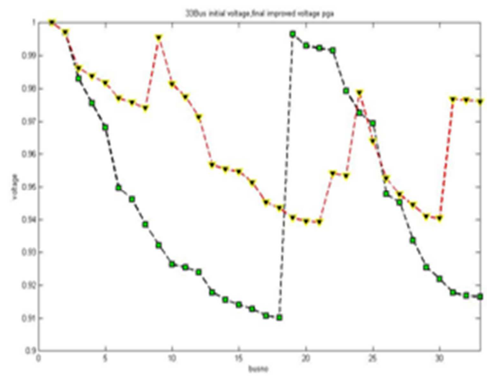

Fig.10.Voltage Variation at Nodes Before and After Reconfiguration

Before reconfiguration the minimum Bus voltage is 0.91 pu and after reconfiguration the minimum Bus voltage 0.945 pu and also it is observed that solution is obtained in less number of iterations.
Table-4 provides feeder currents before reconfiguration and reconfiguration using MOFDR-PSOA algorithm.

Table-4.Feeder Currents

Before Reconfiguration	After Reconfiguration
IF_1=34.01A	IF_1=18.5A
IF_2=6.9729A	IF_2=10.4A
IF_3=14.44A	IF_3=15.4277A
IF_4=5.525A	IF_4=9.88A

It can be observed that the feeder currents are evenly distributed amongst all the feeders in proportion to their capabilities. No feeder is stressed heavily or lightly.

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Table-5 Comparison of MOFDR-PSOA results with other popular existing methods:

System	Power Loss	Voltage Profile	Tie lines
Before Reconfiguration	205.2 kW	V = 1 V= 0.9131	7-20 8-14 11-21 17-33 24-28
After reconfiguration using [SA+TS] [15]	V = 1 V = 0.9378	139.5 kW	6-7 13-14 8-9 31-33 24-28
After reconfiguration using MTS algorithm [16]	139.5 kW	V = 1 V= 0.9378	6-7 13-14 8-9 31-33 24-28
A Modified Particle Swarm Algorithm for Distribution Systems Reconfiguration [19]	139.5 kW	V = 1 V= 0.9378	6-7 13-14 8-9 31-33 24-28
After Reconfiguration using FDR-PSOA method	137.60	0.938	8-21 14-15 8-9 33-33 28-29
After Reconfiguration using MOFDR-PSOA method	**138.70**	**0.945**	**8-21 14-15 8-9 33-33 28-29**

5. CONCLUSION

This paper has proposed the MOFDR-PSOA algorithm for reconfiguration of distribution systems. The main advantage of solving such problems using MOFDR-PSOA over the conventional PSO is that it converges quickly and also doesn't waste time in finding the best possible solution. It also considers different objectives simultaneously and thus arriving at the most optimum configuration of the network. Comparison of the proposed method with popular existing methods illustrates that there is a significant reduction in CPU Execution time and also improvement in results.

REFERENCES

[1] A. Merlin and H. Back, "Search for a minimal-loss operating spanning tree configuration in an urban power distribution system," in *Proc. 5th Power System Computation Conf.*, Cambridge, U.K., 1975, pp. 1–18.

[2] S. Civanlar, J. J. Grainger and S. H. Lee, "Distribution Feeder Reconfiguration for Loss Reduction," IEEE Transactions on Power Delivery, Vol. 3, No. 3, July 1988, pp. 1217-1223.

[3] D. Shirmohammadi and H. W. Hong, "Reconfiguration of electric distribution networks for resistive line loss reduction," *IEEE Trans. Power Del.*, vol. 4, no. 1, pp. 1492–1498, Apr. 1989.

[4] M. E. Baran and F. F. Wu, "Network Reconfiguration in Distribution Systems for Loss Reduction and Load Balancing," IEEE Transactions on Power Delivery, Vol. 4, No. 2, April 1989, pp. 1401-1407

[5] V. Borozan, D. Rajicic, and R. Ackovski, "Improved method for loss minimization in distribution networks," *IEEE Trans. Power Syst.*, vol. 10, no. 3, pp. 1420–1425, Aug. 1995

[6] T. Taylor and D. Lubkeman, "Implementation of Heuristic Search Strategies for Distribution Feeder Reconfiguration," IEEE Transactions on Power Delivery, Vol. 5, No. 1, January 1990, pp. 239-246.

[7] R. J. Sarfi, M. M. A. Salama and A. Y. Chikhani, "Distribution System Reconfiguration for Loss Reduction: An Algorithm Based on Partitioning Theory," IEEE Transactions on Power Systems, Vol. 11, No. 1, February 1996, pp 504-510.

[8] , "Optimal network reconfigurations in distribution systems, part 2: Solution algorithms and numerical results," *IEEE Trans. Power Del.*, vol. 5, no. 3, pp. 1568–1574, Jul. 1990.

[9] Y. J. Jeon, J. C. Kim, J. O. Kim, J. R. Shin, and K. Y. Lee, "An efficient simulated annealing algorithm for network reconfiguration in large-scale distribution systems," *IEEE Trans. Power Del.*, vol. 17, no. 4, pp. 1070–1078, Oct. 2002.

© 2005 - 2012 JATIT & LLS. All rights reserved·
ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

[10] T. P. Wagner, A. Y. Chikhani, and R. Hackam, "Feeder reconfiguration for loss reduction," *IEEE Trans. Power Del.*, vol. 6, no. 4, pp. 1922–1933, Oct. 1991.

[11] Q. Zhou, D. Shirmohammadi, and W. H. E. Liu, "Distribution feeder reconfiguration for service restoration and load balancing," *IEEE Trans. Power Syst.*, vol. 12, no. 2, pp. 724–729, May 1997.

[12] R. Taleski and D. Rajicic, "Distribution network reconfiguration for energy loss reduction," *IEEE Trans. Power Syst.*, vol. 12, no. 1, pp. 398–406, Feb. 1997.1999, pp. 641–648.

[13]Augugliaro *et al.* have proposed artificial-intelligence-based applications in a minimum loss reconfiguration

[14]Taleski and Rajicic have proposed a method to determine the configuration with minimum energy losses for a given period.

[15] Young-Jae Jeon and Jae-Chul Kim, "Application of Simulated Annealing and Tabu Search for Loss Minimization in Distribution Systems," Electric Power and Energy Systems, Vol. 26, No. 1, January 2004, pp. 9-18.

[16] S. F. Mekhamer, A. Y. Abdelaziz, F. M. Mohammed and M. A. L. Badr, "A New Intelligent Optimization Technique for Distribution Systems Reconfiguration", Proceedings of the Twelfth International Middle-East Power Systems Conference MEPCON'2008, South Valley University, Egypt, March 2008, pp. 397-401.

[17] J. Kennedy and R. Eberhart, "Paricle Swarm Optimization", Proceedings of the IEEE international conference on Neural Networks, Vol.4, Dec 1995, pp.1942-1948.

[18] T. Peram, K. Veeramacheneni and C. K. Mohan, "Fitness distance ratio based particle swarm optimization," Proc. of the IEEE Swarm Intelligence Symposium April 24–26, 2003, pp. 174-181

[19] A Modified Particle Swarm Algorithm for Distribution Systems Reconfiguration 2009

Journal of Theoretical and Applied Information Technology
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