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TRANSMISSION EXPANSION PLANNING BASED ON PSO

Arash Zarinitabar*, Hamdi Abdi** AND Hamid Fattahi***

Declaration

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Abstract

Transmission Expansion Planning (TEP) is one of the important issues for planning power systems. Particle Swarm Optimization (PSO) is used as one the modern intelligent methods in the fields of Electrical Engineering and it can generate acceptable solutions in comparison with other methods. In this paper, supplying load demand by minimizing costs in restructured environment is considered as one of the major requirements of power electric industry; Also load demand and minimum cost are combined by doing multiple hierarchical *optimizations. A comparison between proposed algorithm and PSO is done. The results show that PSO produces more and various optimum solutions and it has an understandable structure in comparison with other algorithms. Also it is shown that PSO gives choices to transmission planners so that they can choose the suitable routes which have maximum* Compatibility *in order to maintain the existing lines as well as supply the future load.*

Keywords: Restructured power system; Transmission Expansion Planning; Particle Swarm Optimization (PSO)

1. Introduction

TEP includes planning for all the changes required in transmission part, in other words TEP makes balance between predicted load demand and supplied power by minimizing investment and operating costs. Also it should consider technical, economical and environmental constraints in a long term planning. Then TEP is a complicated, nonlinear and synthetic optimization problem. Solutions should include the type and quality of transmission equipment, their location in power system and yearly

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overall timing for desired planning. Appearance of various uncertainties in investment decisions and increasing load demand, also future location and number of plants make this issue intensely risky and synthetic [1]. To solve TEP problem, various static and dynamic models are represented in order to reduce complication and computation time [2]. Old optimization techniques are based on searching solutions for the problem and they need to long time for computing [1,2]. Heuristic methods as a part of new methods which are initiated from classics optimization iterative methods have been used interesting procedure for finding the best solution [3-5]. However these methods cannot guarantee reaching to overall optimum solution, too. Meta-heuristic methods as effective tools for solving complicated optimization problems can produce high quality solutions and their computational time is appropriate. Nowadays, meta-heuristic techniques such as PSO can successfully solve optimization problem related to power systems [6,7].

In this paper, PSO is applied to a test power system (6-bus Garver system) and optimum solution of object function for Static Transmission Expansion Planning (STEP) is investigated. This method is simpler than a multilevel model and is a robust method for solving integer programming problems in which there are many local optimum solutions. Effectiveness of PSO in proposed system is investigated by comparing the resulting solutions to other methods. Then a proposed algorithm is introduced and the results of using this algorithm are investigated.

The rest of this paper is organized as follow: The structure of PSO is described in section 2. Section 3 includes proposed algorithm and its implementation. In section 4, the results of PSO implementation is analyzed and its advantages than other algorithm are examined. Conclusion is presented in section 5.

2. Concepts of PSO Optimization Algorithm

In this section, we introduce PSO method based on optimizing mathematical tools [8-12]. After that, the mathematical model applied to STEP problem is explained.

2.1. PSO Principles: Swarm intelligence is a branch of artificial intelligence studying complicated social behaviors in decentralized systems which are automatically organized and have a social structure. Swarms are the basis of gathering behaviors and features of all intelligence groups; they are based on the following five principles:

1. Vicinity (proximity): the ability to show the extent and time of calculations
2. Quality: the population responsibility to the environmental quality factors
3. Distinct Reaction: the productivity of an infinitive set of different reactions
4. Stability: the ability to maintain the constant behavior under smoothly environmental changes

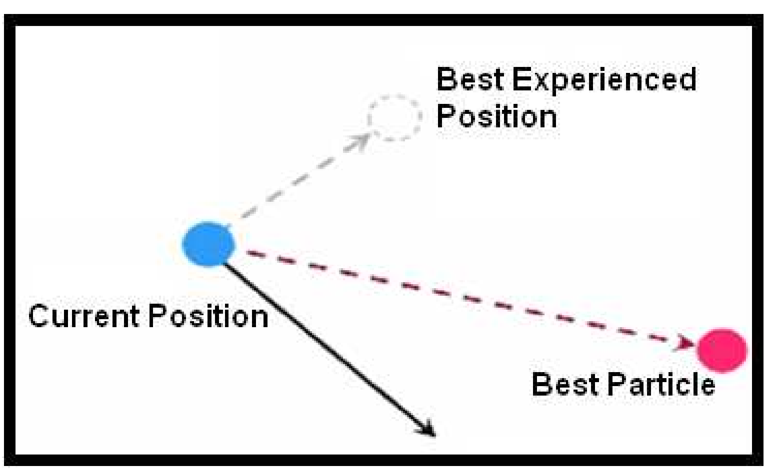

Fig.1. Vector representation for describing equations of particles behavior

5. Fitness: the ability to change behavior during change imposition by external factors.

The basis of PSO algorithm is that the best experience or position obtained by each factor will be recorded and then will be extended to each component or/ and total population. Fig.1 and Fig.2 show the above described procedure.

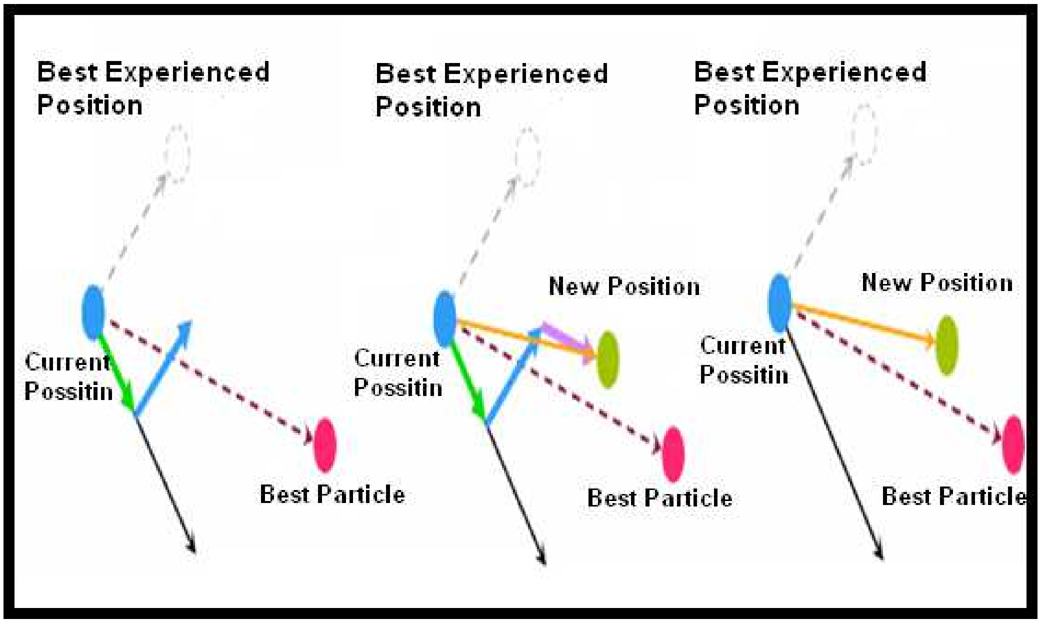

Fig.2. The procedure of moving the position of the best swarm to the new position

In a mathematical framework, if ($A \subset \mathrm{R}^n$) is the search space and ($f : A \longrightarrow Y \subseteq R^n$) is objective function then available population in this space will be named swarm and the individual of this population will be called particle.

Each swarm can be defined as a set of N particles:

S=(xi,$xi2$,...xim) (1)

Where

xi=(xi1,xi2,...,xim)$\in A$ i=1,2,...N

N is a function which is determined by user and it is related to the parameters of the problem. Each particle can include ***m*** vector component which are defined the other dimension of the problem.

$f_{(x)}$, the objective function is given for all the points of existing space A, therefore each particle is a unique function of fi=f(xi)$\in Y$ values. It is supposed that particles move repeatedly in space A, adjust their positions and pick up speed, where:

Vi=Vi1,Vi2,...,VimT (2)

For ***i= 1,2,….,N.*** Particles velocity is adjusted by the resulting data from previous iteration step of algorithm. This requirement is performed in each period of memory. On the other hand, each particle can save the best position which is faced to during the searching. Then we have:

P={p1,p2,...,pm} (3)

P is a set of memories includes the best positions in which each particle is always located; where:

$p_i = (p_{i1}, p_{i2}, \ldots, p_{im})^T \in A$

And ***i*=*1, 2,…,N*..** By minimizing the problem and considering g as the index of best position with smallest value in P function for a given t iteration, the first definition of PSO is as bellow:

$$vijt+1=vijt+c1R1pijt-xijt+c2R2pgit-xijt \quad (4)$$

$$xijt+1=xijt+vijt+1 \quad (5)$$

Where

i* = *1,2,….,N and ***j* = *1, 2, …, M.***

t shows the number of iterations, R_1 and R_2 are random values which are uniformly distributed between [0, 1]. c1 and c2 are importance factors which are respectively named cognitive and social parameters. After updating and evaluating particles, in each iteration the best position (memory) also updates. After that, in each iteration the index of new g is determined in order to update the best complicated positions.

2.2. Mathematical Modeling- DC Model

The existing mathematical model is very similar to DC model which is described as follow:

$$minv(k,l)\in \Omega cklnkl \quad (6)$$

$$S_f + g = d \quad (7)$$

$$fkl-yklnkl0+nkl\theta k+\theta l=0, \quad (8)$$

$$fkl\leq nkl0+nklfkl , \quad (9)$$

$$0 \leq g \leq \bar{g} \quad (10)$$

$$0\leq nkl\leq nkl \quad (11)$$

θ*l*,*fkl* are infinitive. Also $(k,l) \in \Omega$ in which c_{kl} ,*ykl*, n_{kl}, n_{kl}^0, *fkl* and $\bar{f}_{kl}$ are respectively related to the cost of adding one circuit to the forward direction *k-l*، circuit sensitivity *k-l*، the number of existing circuit in the studied circuit, total load flow and maximum load flow corresponding to it for each existing circuit in forward direction *k-l.*

Variable ***v*** is the investment outlay, S is the transposed of nodes and branches' intersection matrix of studied power system, *f* is a vector of f_{kl} element, g is a vector of *gr* elements (produced in *r* bus) which its maximum is g , d is demand vector, $\bar{n}_{kl}$ is the maximum number of circuits which can add to forward direction *k-l*, θ_l is the phase angle of *l bus*, and Ω is a set of all forward directions.

The objective function is considered as (6). The constraints shown in (7) are represented power protection in each node. These restrictions are modeled in DC equivalent circuit of network by KCL.

The restriction mentioned in (8) is related to apply ohm law to DC equivalent circuit of network. Then KVL is considered in calculations and these constraints are nonlinear.

3. Method of Algorithm Implementation

In this section, PSO implementation in TEP problem is explained and the effectiveness of algorithm is examined.

3.1. Implementation Steps of PSO Algorithm

1) Entering the electrical network data
2) Adjusting PSO parameters (i.e. swarm size, number of neighbors, maximum number of iterations, first iteration and etc.)
3) Initializing particles positions and random velocities.
4) Evaluating objective function by using of DC model which is described in section (2.2).
5) Updating the best individual characteristics and local positions of particles.
6) If considered stop criteria are not enough, these steps must be added:

6-1) increasing the number of iterations
6-2) updating the velocity of each particle by the equations (4, 5, 14)
6-3) examining the velocity constraints
6-4) updating the swarm
6-5) examining the swarm constraints
6-6) evaluating the objective function by using of DC model shown in section (2.2)
6-7) updating the best generalities, characteristics and local positions of particles
7) Finish.

3.1.1. Network Data : In normal case, the data used for STEP implementation is depended on electrical networks conditions. The problem dimensions are considered by using the number of forward direction in which the possibility of adding circuits to the system based on load flow and load patterns is exist.

3.1.2. Setting the Parameters : Some parameters are very important to ensure PSO convergence. The number of particles (N) is a dependent parameter to the problem which can choose based on the importance of problem. The values of parameters are identified by trial and error [11].

3.1.3. Initializing the swarm and velocities : Here, similar random initialization technique is used which is an evolutionary computational method. This method just includes random vectors with the same distribution probabilities defined between [0, 1]. Then produced values in corresponding search space are divided and particles and velocities corresponding to them are adjusted based on their limitations.

3.1.4. Swarms and velocity constraints : For limiting the search space, maximum and minimum constraints are defined for each particle. In this problem, the number of forward circuits in the main electrical network is *xmin* and the maximum number of forward circuits for each direction is *xmax* . These two quantities are defined as the particles limits. As well, components velocities are examined to maintain it respectively between the constraints -*vmax* and *vmax*, in which *vmax* is supposed as *2xmax*.

3.1.5. Evaluating of Objective Function : To meet the existing constraints, the objective function (6) is slightly modified and written as follow:

$$F0 = f(x)+p(x) \qquad (12)$$

$$xi=ni1,ni2,\ldots,nim,x\in A\subset Rn$$

x is a vector including the number of n_{kl} circuits for each particle with importance degree of m – here the number of forward directions candidate for adding to circuits- which is added to each *k-l* forward direction .

P(x) is penalty function that defines as below:

1. Zero, if *x* is a feasible point in search space.
2. P1, if *x* is a broken constraint in equations.
3. (P2*nl), if *x* is a broken constraint of equation.

Where *nl* is the number of lines in which load flow is exceeded of the limits. When limitations are exist, it is possible to have an algorithm which does not consider isolated nodes of power network and becomes convergence to a feasible solution. As well, adding some constraints to the problem will be very simple.

3.1.6. Updating velocities and swarm: STEP is formulated by integer variables. Therefore, the equation (4) is moderated to some extent and shown as follow:

$$xijt+1=round[xijt+vijt+1] \qquad (14)$$

Therefore, is instantly updating by varying the position of equation; then its answer will be rounded to nearest integer.

3.1.7. Stop Criterion: Here, two criteria are used to stop the algorithm. First, the maximum number of allowed iterations which are restricted to the number of evaluation functions. Since the studied system with known solutions is used, the second stop criterion is related to future convergence in known values of function. Stepped searching also can be used as another stop criterion. Furthermore, the number of evaluation functions can be considered as a stop criterion.

4. Results

Here, a test system (6-bus Garver system) is used: this 6 bus system has 15 candidate branch with total load of 760MW. The maximum lines which are acceptable in each forward direction equal to 4. PSO is successful in reaching to optimum values for system. This system is frequently used in various publications and studies of transmission system planning as a very famous test system. Complete list of required data are available in [13,14].

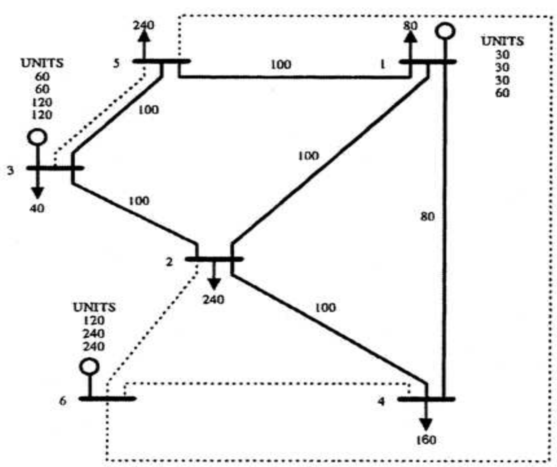

Fig.3. Schematic Garver system after applying propose d algorithm in [15]

Now, for better understanding about the effect of PSO, we overview the results of a typical proposed algorithm using previously in TEP problem [15] and then compare it to the explained PSO algorithm. Required data and the process of performing algorithm are available in [15]. After performing the related algorithm, the lines marked by dotte lines are added to Garver system.

PSO algorithm implements and runs in MATLAB. The function of evaluating process can be generated by DC model introduced in section (2.2). The tests can be done without considering generation timing. The results of solving this system are shown in figure4. Here, the PSO effectiveness applying to transmission expansion planning is represented and its related data are analyzed later. This test is done with 300 iterations. One of the advantages of PSO is that most of its parameters are adjusted automatically. However, the most sensitive parameter in this problem is swarm size that is common for all PSO techniques and it is determined through a combination of experiences resulting from trial and error. Generation Unit Size Cost (US$=200,000) is considered without further planning of generation. Two bellow tables are represented in order to compare the effect of Swarm Size (SS) in algorithm convergence. It is seen that by increasing the swarm size, the success rate of algorithm is increased. In the bellow tables, u is a parameter using for converging the algorithm.

T A B L E 1 *Examination of PSO effectiveness by using SS=60*

		PSO	
	u = 0	u =0.5	u=1
Test Time	100	100	100
Success Rate	100	88	50
Average of Iterations	29	11	10
Standard Deviation of Iterations	8	2	5
Average Evaluation Function	1753	656	1215

T A B L E 2 *Examination of PSO effectiveness by using SS=80*

		PSO	
	u = 0	u =0.5	u=1
Test Time	100	100	100
Success Rate	100	89	60
Average of Iterations	28	11	12
Standard Deviation of Iterations	7	4	4
Average Evaluation Function	2244	883	1922

Convergence procedure of PSO algorithm is shown in figure 5.

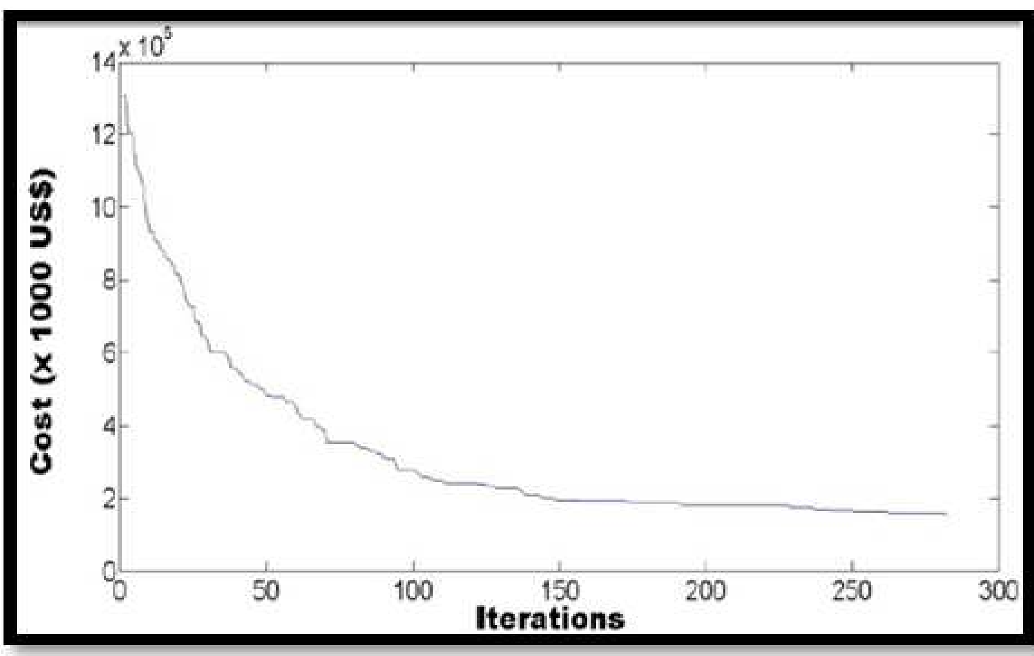

Fig.5.Convergence procedure of PSO in the above problem

By performing PSO, bellow circuits are adding to 6-bus Garver system:

$\boldsymbol{n_{3\text{-}5}=1}$, $\boldsymbol{n_{4\text{-}6}=2}$ and $\boldsymbol{n_{2\text{-}6}=4}$.

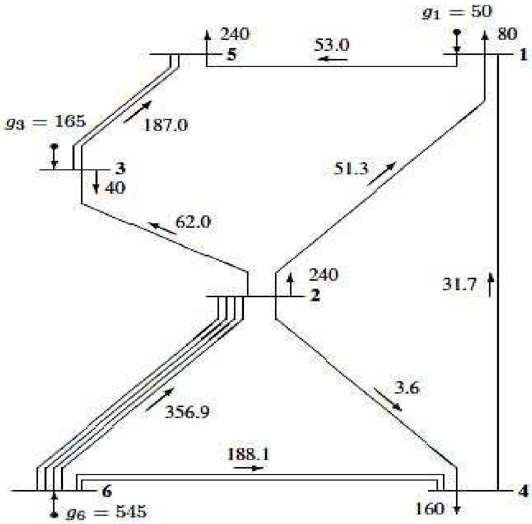

Fig.4. Optimum schematic of transmission system expansion in a 6-bus Garver system by using PSO

5.Conclusion

By comparing the results of two above algorithms, it is obvious that PSO produces various and more optimum solutions. Also in comparison with other algorithms, PSO has a routine and intelligible structure which is one the advantages of this algorithm. From the above test, it was found that using PSO can make a choice for transmission planners to choose the best optimum directions having maximum compatibility in order to maintain existing lines and also supply the future load. If economic issues are not propounded, PSO can easily determine new required lines to supply the future load demand. Considering economic issues in TEP problem by using PSO is a new idea which is necessary to be addressed to it.

References

[1]M. Oloomi Buygi. H. M. Shanechi. G. Balzer & M. Shahidehpour. *"Transmission Planning Approaches in Restructured Power Systems."*IEEE 2003 Bologna Power Tech Conference, June 23-26, Bologna, Italy.

[2]Gerardo Latorre , Rubén Darío Cruz. Jorge Mauricio Areiza & Andrés Villegas. *"Classification of Publications and Models on Transmission Expansion Planning"* IEEE TRANSACTIONS ON POWER SYSTEMS, VOL. 18, NO. 2, MAY 2003.

[3]Muhammad Rashid, *"Combining PSO Algorithm and Honey Bee Food Foraging Behavior for Solving Multimodal and Dynamic Optimization Problems"*, Department of Computer Science. National University of Computer & Emerging Sciences, Islamabad, Pakistan. (February 2010)

[4]M. Mahdavi, H. Monsef, A. Bagheri.*" Transmission Lines Loading Enhancement Using ADPSO Approach"* International Journal of Electrical and Electronics Engineering 4:6 2010.

[5]Manuel Costeira Da Rocha & João Tomé Saraiva.*"Discrete Evolutionary Particle Swarm Optimization for Multiyear Transmission Expansion Planning"* 17th Power Systems Computation Conference. Stockholm Sweden - August 22-26, 2011.

[6]Del Valle, et.al, *"Particle Swarm Optimization: Basic Concepts, Variants and Applications in Power Systems"* IEEE Transactions on Evolutionary Computation, Vol. 12, No. 2, April 2008

[7]H. Shayegui, M. Mahdavi, A. Bagheri, *"Discrete PSO algorithm based optimization of transmission lines loading in TNEP problem"*, Energy Conversion and Management, pp. 112-121, Elsevier, October 2009

[8]Miranda, *"Evolutionary Algorithms with Particle Swarm Movements"*, Proceedings of the 13th International Conference on Intelligent Systems Application to Power Systems, pp 6-21, 6-10 Nov. 2005.

[9]V. Miranda, Hrvoje Keko, Alvaro Jaramillo, *"EPSO: Evolutionary Particle Swarms,"* en Advances in Evolutionary Computing for System Design, Serie: Studies in Computational Intelligence, vol 66, L. Jain, V. Palade, D. Srinivasan, Eds. Springer, 2007, pp 139-168.

[10]K. Parsopoulus, M. Vrahatis, *"Particle Swarm Optimization and Intelligence: Advances and Applications"*, ISBN 978-1-61520-666-7, Information Science Reference, USA, 2010.

[11]Clerc, *"Particle Swarm Optimization"*, ISBN 978-1-905209-04-0, ISTE, Great Britain, 2006.

[12]J. Kennedy, R. Eberhart, *"Swarm Intelligence"*, ISBN 1-55860-595-9, Academic Press, USA, 2001.

[13]R. Romero, A. Monticelli, A. García, S. Haffner, *"Test systems and mathematical models for transmission network expansion planning"*, IEE Proc.-Gener. Transm. Distrib. Vol. 149, No. 1, pp. 27-36, January 2002.

[14]R. Romero, C. Rocha, J.R.S. Mantovani, I.G. Sanchez, *"Constructive heuristic algorithm for the DC model in network transmission expansion planning"*, IEEE Proc.-Gener. Transm. Distrib., Vol.152, No. 2, pp. 277- 282, March 2005.

[15]G R Kamyab, H Rajabi Mashadi , M fotohi. *"Network Transmission Expansion Planning for Increasing competition and Decreasing Energy Not Supplied"*. 21th international power system conference. Tehran iran. 98-F-PSS-651

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