Pso Based Power Loss Reduction in Ac-Dc Systems

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Abstract – **This paper presents a new optimization approach for solving the economic operation with consideration of wind, solar, micro-turbine, fuel cells, battery and load in an energy system. mathematical models of each micro source and the system model of the micro-grid economic operation are established, and the system model is solved by improved particle swarm optimization (pso) algorithm. the best output of each micro source and energy storage unit and the lowest operating cost comparing by improved pso is compared with the traditional pso. the matlab simulation indicates the high speed and accuracy of the improved pso, and verifies the effectiveness of the model.**

Keywords- **micro grid, time-of-use, bee colony optimization, renewable energy.**

I. INTRODUCTION

1. General Information Regarding Micro-grid:

The liberation of the energy market and the new conditions in the energy field are leading towards the finding of more efficient ways of energy production and management. The introduction of new ideas capable of evolving in the new conditions might lead to more suitable solutions compared to any possible malfunctions the new market model can create.

The electricity marketplace is undergoing a tremendous transformation as it moves towards a more competitive environment. The 'growing pains' of this transformation – price instability, an ageing infrastructure, changing regulatory environments – are causing both energy users and electric utilities to take another look at the benefits of distributed generation (DG).

The combination of utility restructuring, technology evolutions, recent environmental policies provide the basis for DG to progress as an important energy option in the near future. Utility restructuring opens energy markets, allowing the customer to choose the energy provider, method of delivery, and attendant services. The market forces favor small, modular power technologies that can be installed quickly in response to market signals.
This restructuring comes at a time when:

* Demand for electricity is escalating domestically and internationally;
* Impressive gains have been made in the cost and performance of small, modular distributed generation technologies
* Regional and global environmental concerns have placed a premium on efficiency and environmental performance; and

II. PROPOSED METHODOLOGY

As declared before, PSO simulates the behaviors of bird flocking. Suppose the subsequent scenario a gaggle of bird's square measure haphazardly looking out food in a neighborhood. There is only 1 piece of food within the space being searched. All the birds don't recognize wherever the food is But they acumen way the food is in every iteration. So what is the best strategy to search out the food? The effective one is to follow the bird that is nearest to that food.

PSO learned from the situation and used it to resolve the optimization issues. In PSO, every single answer may be a "bird" within the search area. We call it "particle". All of particles have fitness value that square measure evaluated by the fitness operates to be optimized, and have velocities that direct the flying of the particles. The particles fly through the matter area by following this optimum particle.

PSO is initialized with a bunch of random particles (solutions) so searches for optima by change generations. In each iteration, every particle is updated by following 2 "best" values. The first one is that the best resolution (fitness) its achieved up to now.(The fitness price is additionally hold on). This price is termed best. Another "best" price that's half track by the particle swarm optimizer is that the best price, obtained up to now by any particle within the population. This best price could be a world best and known as g best. When a particle takes a part of the population as its topological neighbors, the most effective price could be a native best and is termed l best. Comparisons between Genetic Algorithm and PSO Most of evolutionary techniques have the following procedure:

* Random generation of an initial population

- Reckoning of a fitness value for each subject. It will directly depend on the distance to the optimum.
- Reproduction of the population based on fitness values.
- If requirements are met, then stop. Otherwise go back to 2.

From the procedure, we are able to learn that PSO shares several common points with GA. Both algorithms begin with a gaggle of at random generated population, each have fitness values to gu age the population. Both update the population and look for the optimum with random techniques. Both systems do not guarantee success. However, PSO doesn't have genetic operators like crossover and mutation.

Particles update themselves with the internal velocity. They even have memory that is very important to the rule. Compared with genetic algorithms (GAs), the information sharing mechanism in PSO is significantly different. In GAs, chromosomes share information with each other. So the whole population moves sort of a one cluster towards an best space. In PSO, solely g Best (or l Best) offers out the data to others. It is a one -way information sharing mechanism. The evolution only looks for the best solution. Compared with GA, all the particles tend to converge to the most effective resolution quickly even within the native version in most cases.
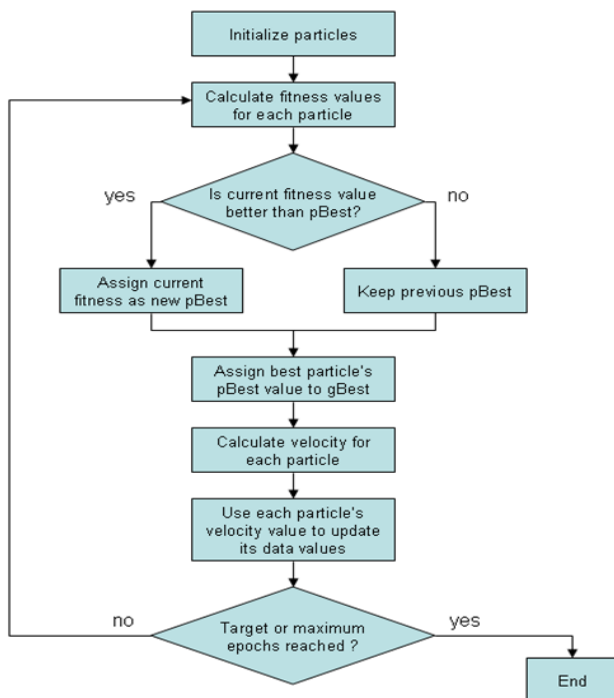

Fig .1 Flow Diagram illustrating the particle swarm optimization algorithm.

PSO Algorithm
1. The current positions,
2. The current velocities,
3. The distance between the current position and pbest,

4. The distance between the current position and the g best. Any optimization problem may be solved by generall particle swarm optimization algorithm. Particle swarm optimization (PSO) algorithm has the basic pseudo-code is given as follows:

Start
For each particle
Initialize particle with feasible random numbers
End
While maximum number of iterations (or any other converge criterion) is not met
For each particle
Calculate fitness value
If the fitness value is better than best fitness value (pbest) in history
Set current value as the new pbest
End
End
Choose the particle with the best fitness value of all the particles in the history as the gbest
For each particle
Calculate particle velocity
Update particle position
End
Finish

III. RESULTS AND ANALYSIS

6-Bus Data sets: These are shows by output of total 6 bus IC power with Noted that Maximum power 750KW in 6 bus data set and Maximum iteration on 100 By a Jacobi Method

3. 1 BUS DATA SETS:

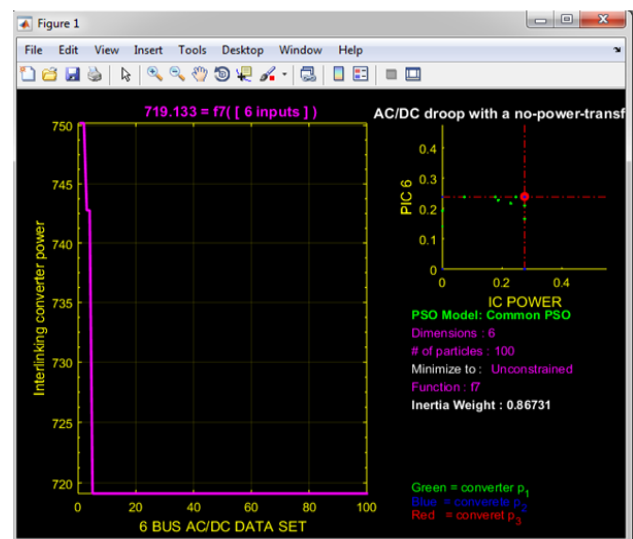|				
0.9645	0.00	000	00	0.2752
0.9631	−0.0057	1.3781	1.4097	0.778
0.9653	0.0115	00	0	0.4128
0.9648	0	0	0	0.2630
0.9505	0	0.833	00	0.2556
0.9681	0	000	0	0.237

Fig.2 Result of applied 6 Bus data set outputs.

MG	Bus #	Bus Type	DR Type	$|V|$ (p.u.)	δ (deg.)	P_L (p.u)	Q_L (p.u)	P_{DR} (p.u.)	Q_{DR} (p.u.)	η_p (%)	η_q (%)
AC	1	Droop	DG	0.9645	+0.0000	—	—	0.2752	0.1895	77.40	71.07
	2	PQ	–	0.9631	−0.0057	1.3781	1.0497	0.7778	0.5833	—	—
	3	Droop	DS	0.9653	+0.0115	—	—	0.4128	0.2779	77.40	69.49
DC	1	Droop	DS	0.9648	—	—	—	0.2630	—	70.46	—
	2	P	—	0.9505	—	0.8333	—	0.2556	—	—	—
	3	Droop	DG	0.9681	—	—	—	0.2378	—	63.71	—
						$\sum P_L$ 2.2114	$\sum Q_L$ 1.0497	$\sum P_{DR}$ 2.2222	$\sum Q_{DR}$ 1.0507	P_{Loss} 0.0108	Q_{Loss} 0.0010
IC	IC #	AC Bus	DC Bus	V_{ac} (p.u.)	V_{dc} (p.u.)	Δe (p.u.)	P_{ic} (p.u.)	Q_{ic} (p.u.)	η_p (%)	η_q (%)	
	1	1	1	0.9645	0.9648	0.0462	−0.0462	—	4.62	—	
	2	3	3	0.9653	0.9681	0.0404	−0.0404	—	4.04	—	

Table 1 Parameter control table.

Interlinking Converter power	719.1328
Power loss	0.00039
Peak load power	2.77877

IV. CONCLUSIONS

The modeling of hybrid micro grid for power system configuration is done in MATLAB/SIMULINK environment. The present work mainly includes the grid tied mode of operation of hybrid grid. The models are developed for all the converters to maintain stable system under various loads and resource conditions and also the control mechanism are studied. MPPT algorithm is used to harness maximum power from DC sources and to coordinate the power Exchange between DC and AC grid.

Although the hybrid grid can diminish the processes of DC/AC and AC/DC conversions in an individual AC or DC grid, there are many practical problems for the implementation of the hybrid grid based on the current AC dominated infrastructure. The efficiency of the total system depends on the diminution of conversion losses and the increase for an extra DC link. The hybrid grid can provide a reliable, high quality and more efficient power to consumer. The hybrid grid may be feasible for small isolated industrial plants with both PV systems and wind turbine generator as the major power supply.

Scope of future work-
The modeling and control can be done for the islanded mode of operation.
The control mechanism can be developed for a micro grid containing unbalanced and nonlinear loads.

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