

A Review on optimization of reactive power dispatch by PSO



Engineering

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ABSTRACT

This paper presents a review of many papers and various techniques of optimization of reactive power over a past decade. The complexity of reactive power optimization is in a straight line concerned not only with service brilliance and consistency of supply, but also with financial system and security of the power systems. The main aim of this paper is to put all studies together under single heading for comparison & better understanding of all studies performed in past.

Introduction:

The Optimal Reactive Power Dispatch trouble is a nonlinear optimization problem with many uncertainties. Particle Swarm Optimization (PSO) is one of the evolutionary calculation (EC) techniques. It is of large importance to preserve appropriate voltage levels at all power system buses, since every part of current day equipments which expand electric power such as illumination; thermal appliances, electronic appliances and motors, are designed for use surrounded by a definite workstation voltage, the nameplate voltage. If the voltage deviates from this value, the kindness life suspense, and the advantage of performance of the equipment will experience. Here the RPO problem has been formulated as a constrained multi-objective optimization problem by combining of two objective functions (real power loss and voltage profile improvement) linearly. Usually, PSO has a more universal penetrating ability at the found of the sprint and a local search in close proximity to the end of the sprint. Therefore, while solving problems with more some degree of optima, there are more potential for the PSO to observe local optima at the finish of gallop. A power system needs to be with enough reactive coffers to meet the improved reactive power demand under critically swarm intelligence.

Particle Swarm Optimization and genetic algorithm for power dispatch

P.R.Sujin, Dr.T.Ruban Deva Prakash and M.Mary Linda it state that reactive power is an important factor in sustaining the real power send out by maintaining voltage permanence and system consistency. The main objectives of reactive power convey are focused on the technical side of reactive support such as reduction of transmission losses. Reactive power cost compensation to a generator is based on the incurred cost of its reactive power giving less the cost of its contract to support the active power delivery. The function of reactive power dispatch is to verify the proper quantity and position of reactive support. Reactive Optimal Power Flow (ROPF) formulation is developed as an study tool and the soundness of proposed method is examined using an IEEE-14 bus system. The entirety reactive cost is divided into generators' responsibility and loadings' duty. The method of estimate adopted in this paper has a common basis for every market accomplice and hence it is consistent and equitable. The results are obtained using PSO illustrates that the proposed algorithm is simple and practical. The results obtained give a capable, possible and optimal solution.[1]

Vivek Kumar Jain, 2Himmant Singh shows the solution to reactive power optimization trouble with a Hybrid particle swarm optimization (PSO) approach. This algorithm altered the stochastic initialization and adopted a principle of particle searching by itself. Several particles in possible solutions were used

to guide swarms motion and modernize the performance of the planned hybrid approach is established with the IEEE-30 and IEEE-57 bus systems and also the recital of this hybrid PSO is compared with that of particle swarm optimization, genetic algorithm and evolutionary programming. In addition, to strengthen the refined search skill in restricted region, local search method is employed and hybridized with PSO algorithm. Based on the above constraints management procedure and restricted discover method, the HPSO algorithm model is proposed for reactive power optimization (RPO) complexity.[2]

Mohammad Yunus Ali and Kaamran Raahemifar present Reactive power optimization is a mixed integer nonlinear programming problem where metaheuristics methods have proven fit for given that optimal solutions. Optimal reactive power dispatch (ORPD) is a key tool to achieve safe and profitable operation of power systems. In this paper, swarm and evolutionary algorithm have been applied for reactive power optimization. This paper also presents a particle swarm optimization for reactive power and voltage control allowing for voltage stability. The proposed method find a control strategy with uninterrupted and discrete control variables such as AVR operating values, OLTC tap positions, and the amount of reactive power compensation equipment. The objective of the proposed PSO is to reduce the total support cost from generators and reactive compensators. It is achieved by maintaining the whole system power loss as minimum thereby reducing cost provision.[3]

Vivek Kumar Jain, Himmat Singh, 3Laxmi Srivastava present that an capable and consistent Particle Swarm Optimization (PSO) algorithm for solving Reactive power optimization counting voltage deviation in Power System. Reactive power optimization is a compound combinatorial programming problem that decreases power losses and improves voltage profiles in a power system. In this paper, minimization of reactive power via particle swarm optimization (PSO) algorithm. In order to prove the utility of algorithm it is applied to standard reactive power with voltage deviation problem through combining of two objective functions (real power loss and voltage profile improvement) linearly. At the minimization of the voltage divergence, the more optimum result is taken as the active power loss. The planned approach is analyzed and established on the standard IEEE-30 bus test system. The results obtained by proposed algorithm demonstrate its toughness and helpfulness. [4]

Hao Wang Huilan Jiang Ke Xu Guodong Lid says that this paper, based on the individuality of reactive power optimization, a mathematical representation of reactive power optimization, counting comprehensive consideration of the practical constraints and reactive power regulation means for optimization, is reputable. Also particle swarm optimization (PSO) has been studied,

and the method based on superior particle swarm optimization for reactive power is going to be taken in this paper. The algorithm is easy, convergent and of high quality for optimization, and thus suitable for solving reactive power optimization problems, with some application prospect.[5]

B. Zhao, C. X. Guo, and Y. J. Cao, Member, IEEE present Reactive power send off in power systems is a complex combinatorial optimization problem connecting nonlinear functions having manifold local minima and nonlinear and sporadic constraints. In this paper, a solution to the reactive power transmit problem with a novel particle swarm optimization advance based on multi-agent systems (MAPSO) is accessible. This method integrates the multiagent system (MAS) and the particle swarm optimization (PSO) algorithm. An agent in MAPSO represents a particle to PSO and a candidate solution to the optimization difficulty. All agents live in a lattice-like environment, with each agent fixed on a lattice point. In order to obtain optimal resolution quickly, each agent competes and cooperates with its neighbors, and it can also learn by using its information. Making use of these agent-agent communications and evolution mechanism of PSO, MAPSO realizes the intention of optimizing the value of objective function. MAPSO applied to most favorable reactive power dispatch is evaluated on an IEEE 30-bus power system and a practical 118-bus power system. Simulation outcome show that the proposed move toward converges to better solutions much faster than the previous reported approaches. The optimization approach is general and can be used to solve other power system optimization troubles as well.

A MAPSO method has been developed for purpose of the universal or near-global optimum solution for most advantageous reactive power dispatch. The proposed method benefits mainly from the environment of the agent pattern and the behaviors of agents. In the environment, each agent can participate and collaborate with its neighbors, and further regulate its position in the search space according to PSO. Thus, each agent can speedily transfer its useful in sequence to the global environment, and all agents can share the in a row after a process of distribution. Owing to the three operators, the advantage of the MAPSO method is its ability in finding high-quality solutions unfailingly with the faster meeting properties. The performance of the proposed scheme demonstrated through its evaluation on the IEEE 30-bus power system and a practical 118-bus power system shows that MAPSO is able to undertake universal investigate with a fast convergence speed and a feature of tough computation. From the simulation study, it has been found that MAPSO converges to the global optimum.[6]

A. H. Mantawy, M. S. Al-Ghamdi presents a new algorithm for optimizing reactive power with Particle Swarm Algorithm. A new execution for the particle swarm algorithm has been functional. The objective meaning of the proposed algorithm is to minimize the scheme active power loss. The control variables are, transformer tap positions, generator bus voltages and switch-able shunt capacitor banks. The proposed algorithm has been applied to practical IEEE 6-bus system. Reactive power optimization is a complex combinatorial optimization problem and a new improved numeral coding Particle Swarm Algorithm is accessible to solve this problem. The main objective is to diminish the active power loss in the network, while rewarding all the power system operation constraints. The particle swarm algorithm has been coded as well as the power flow fast-decoupled method using MATLAB. The proposed algorithm has been effectively applied to the IEEE 6-bus system. The simulation results show that PSO algorithm always lead to a satisfactory result. [7]

P. Subbaraj ,P. N. Rajnarayanan present a two-phase hybrid particle swarm optimization (PSO) move toward is used to solve opti-

mal reactive power dispatch (ORPD) problem. In this hybrid approach, PSO is used to investigate the optimal region and direct search is used as local optimization system for finer junction. The performance of the planned hybrid approach is confirmed with the IEEE 30-bus and IEEE 57-bus systems and also the presentation of this hybrid PSO is compared with that of PSO, Evolutionary Programming (EP) and hybrid EP. The performance of the proposed method is compared with the preceding approaches reported in the literature. The performance of hybrid PSO seems to be better in terms of answer quality and computational time. In order to validate the proposed approach, it is tested with two standard test systems having non-linear characteristics and the results are compared with other techniques reported in the writing. The proposed hybrid PSO is obtains lesser loss values than other strategies with lesser computational time. The robustness test is also conducted to prove the reliability of the proposed approach. It is observed from the frequent trial runs, the hybrid PSO approach always converged to near optimal solution. The test results show that, the proposed approach not only improves the solution quality but reduces the computation time also and suitable for optimal reactive power send out problem. [8]

P.Aruna Jeyanthyl, and Dr. D. Devaraj presents a new hybrid particle swarm optimization (HPSO) technique for solving multi-objective real power optimization problem. The objectives of the optimization difficulty are to diminish the losses and to maximize the voltage stability margin. The proposed method expands the original GA and PSO to attempt the mixed –integer non-linear optimization problem and achieves the voltage stability improvement with continuous and discrete control variables such as generator tap position of transformer, terminal voltages and reactive power sources. A comparison is made with conventional, GA and PSO methods for the real power losses and this method is establish to be effective than other methods. In this paper shows that a hybrid particle swarm optimization algorithm move toward to obtain the optimum values of the reactive power variables together with the voltage stability constraint. The usefulness of the proposed method for RPD is demonstrated on IEEE-30 and IEEE-57 bus system with talented results. [9]

C.Kumarl, Dr. Ch. Padmanabha Raju presents the solution of the optimal power flow (OPF) by means of particle swarm optimization (PSO). The main purpose of this paper is to confirm the viability of using PSO problem composed by different objective functions. This OPF problem involves the optimization of different types of idea functions while satisfying a set of operational and physical constraints while keeping the power outputs of generators, bus voltages, shunt capacitors/reactors and transformers tap settings in their limits. The proposed PSO method is established and compared with Evolutionary Programming (EP) approach on the standard IEEE 14-bus system. The results show that the proposed PSO method is capable of obtaining higher quality solutions efficiently in OPF problem. The generation cost and real power losses were condensed through adjustment of generator outputs, generator voltages, tap changing transformers, and shunt compensation. The algorithms EP and PSO were correctly and reliably converged to the global best solution in each case. [10]

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