



## INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY

### Survey of Various Methods for Optimum Load Dispatch in Hybrid Power System

Animesh Masih\*, Dr.H.K.Verma

\* Department of Electrical & Electronics Engineering, CDGI, Indore, India

Department of Electrical Engineering, SGSITS, Indore, India

[akm\\_masih@yahoo.co.in](mailto:akm_masih@yahoo.co.in)

#### Abstract

Scarcity of energy resources, increasing power generation cost and ever-growing demand for electric energy, it is necessary to utilize the power as much as possible. To improve the power utilization factor, economical load dispatch becomes a necessity in the power system. Many researchers have performed various optimizations on the problem of load dispatch. This paper is presenting a survey of some important work done in the field of optimized load dispatch. The paper is concluded with brief comparison of this techniques and the possibility of the further research.

**Keywords:** Economic dispatch , renewable , optimization .

#### Introduction

All important problems in the operation of a power system is related to its Economic dispatch[1]. Rescheduling of the unit outputs can lead to significant cost savings. The characteristics of large units related to input output are highly nonlinear because of valve-point loadings, generating unit ramp rate limits, etc [1].The renewable energy is clean, green, and one of the biggest drivers of the smart grid. Among different renewable resources, solar and wind energy is growing rapidly and promising to be integrated into the smart grid [2]. Economic dispatch is one of the most important problems to be solved in the operation of a power system [4].The optimal allocation for all of the committed generating units to meet the required load demand at minimum operating cost while satisfying system constraints is termed as Economic dispatch (ED) [3]. The primary objective of the economic dispatch problem (EDP) of electric power generation is to schedule the committed generating unit outputs so as to meet the required load demand at minimum operating cost while satisfying all unit and system equality and inequality constraints [4].

#### Literature review

Many research have been done in field of economic dispatch problem some of the work is described in this paper.

*Dakuo He, Fuli Wang and Zhizhong Mao* [1] done study on an efficient hybrid genetic algorithm (HGA) approach for solving the economic  
[http:// www.ijesrt.com](http://www.ijesrt.com)

dispatch problem (EDP) with valve-point effect is presented in their paper. The proposed method combines the GA algorithm with the differential evolution (DE) and sequential quadratic programming (SQP) technique to improve the performance of the algorithm. Performance that they obtain in their result is HGA with 8.48 sec with 17963.83 cost (\$/h).

*Dapeng Wu and Yuguang Fang* [2] done detail study in their paper “A Market Based Scheme to Integrate Distributed Wind Energy”, over efficiently integrating wind energy into the smart grid is gaining momentum under renewable portfolio standard (RPS) with deep wind penetration. In their paper, they consider the wind energy integration of small-scale utilities installed with wind turbines and acted as distributed energy resources (DERs). This approach results in a simple dynamic threshold control policy which maximizes the expectation of the profit for a green utility and is easily implemented online.

*Shanhe Jiang, Zhicheng Ji and Yanxia Shen* [3] in their paper present a novel hybrid approach to the solution of optimal power generation for EELD problems using HPSO–GSA technique. The proposed algorithm provides an interesting combination of PSO and GSA and adopts co-evolutionary technique to update its particle position in the swarm with the cooperation of PSO and GSA. To determine the effectiveness of the proposed algorithm, the results of benchmark numerical

optimization test functions validate the HPSO–GSA has better performance. The results obtained 1009.5890 MW, 21649.9654 \$/h and 0.0568s.

**Y. LABBI and D. BEN ATTOUS** [4] in their paper “big bang–big crunch optimization algorithm for economic dispatch with valve-point effect” done in detail. Study on Big Bang–Big Crunch (BB–BC) optimization algorithm is a new optimization method that relies on the Big Bang and Big Crunch theory. Numerical results demonstrate the efficiency of the BB–BC algorithm compared to other heuristic algorithms approaches is 920.661\$/h, 5.0472 min

**Ahmed Yousuf Saber** [5] in his paper presents a novel modified particle swarm optimization (MPSO), which includes advantages of bacterial foraging (BF) and PSO for constrained dynamic economic dispatch (ED) problem. The proposed modified PSO consists of problem dependent four promising values in velocity vector to incorporate repellent advantage of bacterial foraging in PSO for the complex dynamic ED problem. Finally, a benchmark data set and existing methods are used to show the effectiveness of the proposed method. From simulation results, the method for dynamic ED is scalable and robust.

#### Loading and demand in ETAP

Item	MW
Source(swing bus)	309.838
Source(non-swing buses)	728.101
Total demand	1037.939
Total demand	1036.000
Apparent losses	1.939
System mismatch	0

Table 1. Loading and demand in ETAP

**Amita Mahor, Vishnu Prasad and Saroj Rangnekar** [6] in their paper they concentrate on Practical economic dispatch (ED) problems like nonlinear, non-convex type objective function with intense equality and inequality constraints. The conventional optimization methods are not able to solve such problems as due to local optimum solution convergence. Met a heuristic optimization techniques especially particle swarm optimization (PSO) has gained an incredible recognition as the solution algorithm for such type of ED problems in last decade. His paper summarized the work reported in

literature in the field of economic dispatch using PSO.

**H.T. Jadhav, Ranjit Roy.**[7] ] in their paper Gbest guided artificial bee colony algorithm (GABC) for environmental economic dispatch is applied to optimize the emission and overall cost of operation of wind–thermal power system. The uncertainty in wind power is considered in the cost model by including the power imbalance and costs of available wind power considering different technical constraints such as valve loading effect, prohibited zones, ramp rate limits including the effect of wind power generation on dispatch cost and emission

#### Observation

The various methods for optimum load dispatch have been evaluated by the researcher. The performance of this method is evaluated in term of cost and time consumption in the optimization. The identification of unique solution or minimal solution is the prime motive rather than optimization time.

#### Conclusion

The optimization of load dispatch problem has been evaluated by the various researcher for different categories of power system problem. The optimization technique with the same problem may give the comparative analysis of the methods. Krill herd and Cuckoo search method are latest optimization method which will converge rapidly with best optimization solution. These methods are still needed to apply for load dispatch problem to exposed the new direction in the optimization of power in comparison with the earlier methods.

#### References

- [1] Dakuo He, Fuli Wang, Zhizhong Mao, “A hybrid genetic algorithm approach based on differential evolution for economic dispatch with valve-point effect”, Key Laboratory of Process Industry Automation, Ministry of Education, Northeastern University, Shenyang 110004, China Received 22 August 2006; received in revised form 14 June 2007; accepted 17 June 2007, pp-31-37.
- [2] Dapeng Wu and Yuguang Fang, “A Market Based Scheme to Integrate Distributed Wind Energy”, IEEE TRANSACTIONS ON SMART GRID, VOL. 4, NO. 2, JUNE 2013, pp-976-982.
- [3] Shanhe Jiang, Zhicheng Ji, Yanxia Shen, “A novel hybrid particle swarm optimization

and gravitational search algorithm for solving economic emission load dispatch problems with various practical constraints”, *Electrical Power and Energy Systems* 55 (2014) 628–644.

- [4] Y. LABBI and D. BEN ATTOUS, “big bang–big crunch optimization algorithm for economic dispatch with valve-point effect”, *Journal of Theoretical and Applied Information Technology*, pp-48-54.
- [5] Ahmed Yousuf Saber, “Economic dispatch using particle swarm optimization with bacterial foraging effect”, *Electrical Power and Energy Systems* 34 (2012) 38–46.
- [6] Amita Mahor, Vishnu Prasad and Saroj Rangnekar, “Economic dispatch using particle swarm optimization: A review”, *Renewable and Sustainable Energy Reviews* 13 (2009) 2134–2141
- [7] H.T. Jadhav, Ranjit Roy “Gbest guided artificial bee colony algorithm for environmental economic dispatch considering wind power” *Expert Systems with Applications* 40 (2013) 6385–6399.
- [8] Jeyakumar DN, Jayabarathi T, Raghunathan T. Particle swarm optimization for various types of economic dispatch problems. *Electric Power Energy Syst* 2006;28 (1):36–42.
- [9] Abido MA. A novel multiobjective evolutionary algorithm for environmental/economical power dispatch. *Electric Power Syst Res* 2003;65 (1):71–81.
- [10] A. Botterud, J. Wang, R. Bessa, H. Keko, and V. Miranda, “Riskmanagement and optimal bidding for a wind power producer,” in *Proc. IEEE Power Energy Soc. Gen. Meet.*, 2010.
- [11] Ramesh V, Jayabarathi T, Asthana Samarth, Mital Shantanu, Basu Sampurna. Combined hybrid differential particle swarm optimization approach for economic dispatch problems. *Electr Power Compon Syst* 2010;38:545–57.

	<p><b>Animesh masih</b> Asst. Prof. in Department of Electrical &amp; Electronics Engineering, CDGI, Indore, India <a href="mailto:akm_masih@yahoo.co.in">akm_masih@yahoo.co.in</a></p>
	<p><b>Dr.H.K.Verma</b> Prof. in Department of Electrical Engineering, SGSITS, Indore, India <a href="mailto:vermaharishgs@gmail.com">vermaharishgs@gmail.com</a></p>

## Author Bibliography