A Novel Multi agent based PSO approaches for security Constrained Optimal Power Flows using smooth and non-smooth cost functions

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Abstract

This paper puts forward two new evolutionary multi agent based particle swarm optimization algorithms for solving security constrained (line flows and bus voltages) optimal power flows. These two methods combine the multi agents in two dimensional and cubic lattice structures with particle swarm optimization (PSO). All agents occupy in a cubic and square lattice like environments, with agents fixed on a lattice point in the ascending order of their fitness values. To obtain the optimal solution, each agent in cubic and square lattice competes and cooperates with its neighbor. Making use of these agent-agent interactions, CLSMAPSO and TDLSMAPSO accomplish the purpose of minimizing the Fuel cost value while maintaining all the constraints. In this paper, a Variable constriction factor has been considered for TDLSMAPSO and CLSMAPSO. Both the smooth and non-smooth cost functions were considered to take the effect of multiple fuels and multiple valves effects in to consideration. The outcomes are compared with many other methods like Genetic Algorithms, Differential Evolution, Normal PSO and Ant Colony optimization etc. The OPF problem has been considered with three different cost functions to realize Optimal Power Flow using CLSMAPSO and TDLSMAPSO applied to IEEE 30 bus system. This unique method has the advantage of
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more agent interactions in case of CLSMAPSO which improved the convergence drastically compared to the Two dimensional structure used in paper by sivasubramani and Shanti swarup in reference[2]. It is found that the proposed method is found to be computationally fast, robust, superior and promising from its convergence characteristics.

References

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Index Terms

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