**Article Abstract**

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| **Title:** | **Multi-area economic dispatch with tie-line constraints employing evolutionary approach** |
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| Journal: | *International Journal of Engineering, Science and Technology*, Vol. 2, No. 3, 2010, pp. 132-149. |
| Abstract: | Economic dispatch (ED) has the objective of generation allocation to the power generators in such a manner that the total fuel cost is minimized while all operating constraints are satisfied. For the sake of simplicity, ED is generally solved without accounting for transmission constraints. However, in deregulated power system environment it is essential to model the ED problem for practical multi-area cases with tie line constraints. Most of the conventional gradient based methods are time consuming, suffer from dimensionality problem and assume the fuel cost curves of generating units to be piecewise linear, monotonically increasing in nature. The resulting dispatch solutions are therefore inaccurate; sometimes producing infeasible solutions for modern generating units having non convex cost curves. On the other hand evolutionary methods do not suffer from convexity assumptions and achieve fast solutions even for complex non-linear, non-convex, multi-modal optimization problems. This paper reviews and compares some evolutionary techniques for multi-area economic dispatch (MAED). The paper presents an extensive comparison of the search capability and convergence behavior of i) Classical differential evolution (DE) and its various strategies ii) Classical particle swarm optimization (PSO) and iii) An improved PSO with a parameter automation strategy having time varying acceleration coefficients (PSO_TVAC) for solving MAED problems for two area and three area test power systems with 4, 10 and 40- generating units. The results are found to be superior compared to some recently published results. |
| Keywords: | Differential evolution, Multi-area economic dispatch, multiple fuel options, particle swarm optimization, transmission capacity constraints. Time varying acceleration coefficients (TVAC), Valve point loading effects. |

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