5.1 SUMMARY AND CONTRIBUTIONS

The EP-EPSO and NN-EPSO methods have been successfully implemented to solve different convex and non-convex ED problems. It has been observed that the EP-EPSO has the ability to converge to a better quality solution and possesses better convergence characteristics and robustness than an ordinary PSO. The major contributions of the present research are summarized as follows,

- The new hybrid methods EP-EPSO and NN-EPSO have been proposed to solve the ED problems of electric energy with and without valve-point effects.
- The proposed EP-EPSO and NN-EPSO have been simulated and the results have been tabulated.
- Based on the simulated results, comparison of performance of twenty two different methods have been made.
- The performance of EP-EPSO method is found to be better than DE/BBO, BBO, APSO, GA and 2-phase NN methods in terms of total fuel cost, losses and simulation time. The values have been recorded.
• EP-EPSO method provides a global solution, satisfying the constraints with a very high probability in an acceptable computing time. The performance of this method has been tested for 3, 6, 13, 15, 20, 38 and 40 unit systems and proved to be superior than the conventional and non-conventional numerical methods.

• EP-EPSO has proved to be the best nonlinear programming method to solve constrained optimization problems.

• The performance of this method has been tested for 3, 6, 15, 20, 38 (without valve-point loading) and 3, 13, 40 (with valve-point loading) unit systems. It has been proved to be superior than conventional and non-conventional numerical methods.

• From the Tables 3.2, 3.4, 3.6, 3.8, 3.10, 4.2, 4.4, 4.5, 4.6 and 4.7, it is clear that the EP-EPSO method has a lesser optimal cost than other methods such as DE/BBO, BBO, APSO, GA, 2-phase NN, PSO, NPSO-LRS, CPSO1, CPSO2, Lambda-iteration, Hopfield modelling, PSO_TVAC, NEW_PSO, EP, MPSO, IPSO, DEC_SQP, SA, GA-SA, EP-SQP, PSO-SQP ICA-PSO and NN-EPSO.

• The proposed method has the merits of simple concept, easy implementation and better effectiveness than PSO-SQP. It also has better efficiency than DEC-SQP and robustness of algorithm and is applicable to the large scale system.

• The comparative results demonstrate that the EP-EPSO method has more advantages as mentioned above for solving the real world ED problem.
When comparing the performance of the two proposed methods, EP-EPSO is found to be better in terms of the quality of solution and convergence.

Each optimization method (EP, EPSO, NN, EP-EPSO and NN-EPSO) has been implemented on a personal computer with Core(TM) 2 Duo 2.10 GHZ processor and Matlab7.3 platform.

5.2 SUGGESTIONS FOR FUTURE WORK

The proposed hybrid algorithms, NN-EPSO and EP-EPSO give better results for non-convex ED problems with load balance and power limit constraints. The proposed algorithms can be extended to ED problems with line-flow, stability, reserve and tie-line transaction constraints. Moreover, the proposed algorithms can be applied to other power system optimization problems like unit commitment, optimal power flow, reactive power dispatch and maintenance scheduling.

The proposed algorithms can be applied to optimization problem of other engineering and non-engineering systems. The concept of hybridization can be extended too. The EPSO algorithm can be hybridized with other algorithms like Genetic Algorithm (GA), Differential Evolution (DE) and Ant Colony Optimization (ACO).

The method can also be extended to solve the dynamic ED problem with more inequality constraints such as transmission limits, voltage limits, prohibited operating zones and spinning reserves. This would ensure that more accurate dispatch results are obtained for practical problems in a reasonably good computation time. The future researchers can explore the above discussed areas.