CHAPTER 8

CONCLUSION

The thesis has investigated the behavior of bacteria foraging optimization algorithm for the management of inherent issues of power systems. Here profit based unit commitment with environmental constraints, emission and economic dispatch problems such as economic load dispatch, emission dispatch, combined economic and emission dispatch and emission constrained economic dispatch, economic load dispatch with CCCP and short term hydro thermal scheduling with prohibited operating zones have been considered. The BFA method converges to the global or near global optimal solution, irrespective of the shape of the objective function, like discontinuities and non-smooth functions. The proposed approach is intended for the determination of the global optimal solution and may be implemented as a decision support tool for the power system management.

8.1 RESULTS

The main results of this work are summarized as follows

(i) The profit based unit commitment problem in the restructured power system is a nonlinear optimization problem and when the environmental constraints are included, it becomes a combinatorial optimization problem. The problem is solved by the GA based BFA method. The unit commitment part of the problem is approached by the GA method where as the ELD
portion is efficiently handled by the bacteria foraging algorithm. The proposed algorithm is applied for a standard six units system and eleven units systems and the solution has been compared with other methods.

(ii) The emission and economic dispatch problems have been solved by the proposed BFA method. The developed algorithm has been successfully applied for solving the economic dispatch, emission dispatch, combined economic and emission dispatch and emission constrained economic dispatch problems. The solution obtained by the proposed method has been validated with classical and intelligent techniques. The advantage of proposed algorithm is demonstrated on an IEEE-30 bus system with 6 generators.

(iii) The conventional lambda iterative technique cannot be applied to the economic load dispatch problem (ELD) of a power system with combined cycle cogeneration plants (CCCP) due to the non-smooth and non differentiable nature of fuel cost characteristics. Therefore the computationally intelligent algorithms like the proposed approach will be an efficient way for solving it. The proposed algorithm is demonstrated for a three units system with a combined cycle cogeneration plants in EGAT system of Thailand.

(iv) The short term hydrothermal scheduling problem has been considered with all the hydro and thermal constraints including POZ. The proposed algorithm is properly modified to satisfy all the system constraints so that the optimal solution for the problem has been exactly located by the proposed bacteria foraging algorithm. Two example test systems along
with prohibited operating zones of thermal units have been considered for the study and solved by the proposed method. The comparison of results obtained by the proposed method demonstrates the solution quality and computational efficiency.

8.2 FUTURE WORK

Based upon the results and discussions of the proposed work, the bacteria foraging algorithm can be applied to solve various power system operation and control problems by implementing the following extensions:

1. Phase shifting transformers are used in controlling the direction and magnitude of active power flow at inter-tie buses. The various contingencies likely to occur in a power system have to be studied in order to provide a reliable power system. Therefore, in a multi constrained economic load dispatch problem, the optimum power flow can be performed by having phase shifter angle limits and security limits as the constraints. In addition, it may be noticed that valve-point effects in the case of stream turbines cannot be mathematically modeled easily. However, it can be considered as a typical non-smooth optimization problem. Hence hybrid optimization can be adopted to solve these issues.

2. Ramp rate is a limitation for the amount of power generated per hour. Security limits and voltage constraints limit at various buses have to be checked to provide a secured power system. Therefore GA based BFA method can be tested for a unit commitment problem having ramp rate limits, voltage constraints and security limits.
3. The proposed method should be used for real power loss minimization ensuring voltage stability for various systems having numerous nodes. This ensures the applicability of method under deregulated environment. The contingency analysis can also be performed for simulating various faults. The performance analysis can clearly indicate the stability of the system under such conditions.