CHAPTER 8
CONCLUSION

Recognizing the importance of congestion management problem in the deregulated power system, an attempt is made to relieve congestion employing soft computing techniques.

8.1 REVIEW OF WORK DONE

At first the study is carried out to relieve congestion by generator rescheduling and load shedding using Real Coded Genetic Algorithm. It is found that by this method, congestion is relieved by generation rescheduling alone for certain cases. However, for certain critical cases in addition to generation rescheduling load shedding is also resorted to.

It is not a healthy practice to shed the load for secure operation of the system. There is a need for alternate algorithm to relieve congestion by generation rescheduling alone without going for load shedding. To reach this goal, another method Evolutionary Programming technique, is proposed. It is found that the congestion is relieved only by generation rescheduling when Evolutionary Programming is used in place of GA, for the same test cases considered earlier.

In the congestion management problem, other than relieving congestion in the system, there are other objectives like minimizing the congestion cost, bus voltage violations etc to be optimized. In such cases with more than one objective, the multi-objective problem has to be converted into single-objective problem with suitable penalty factor. Deciding the penalty factor is a critical issue in the multi-objective congestion management problem. To overcome the above difficulty, suitable fuzzy models are developed and incorporated in EP algorithm to solve
multi-objective congestion management problem. It is found that when fuzzy based EP is used congestion is relieved with lesser congestion cost by considering the re-dispatch of the participating generators alone, when compared to EP technique, for the same test cases considered earlier.

When multi-objective problem is converted into single-objective optimization problem only one compromised solution is obtained and this does not provide any choice to the operators. To find multiple optimal solutions, the entire procedure has to be repeated many times to find a different solution in each simulation run. It is time consuming and cannot be used for real time problems. To overcome this difficulty an efficient algorithm, NSGA-II is successfully used for multi-objective congestion management problems to obtain a set of pareto-optimal solutions. This will enable the operator to use his discretion in selecting the solution.

In any large power system rescheduling all the generators is complex and time consuming. So, the power system is divided into various clusters / zones based on the PTCDFs. The most sensitive zone is identified and the generators in the most sensitive zone alone are rescheduled to get the optimal solution quickly. This leads to effective online implementation.

When congestion is not severe, it can be overcome by re-dispatch of generators. Generally re-dispatching the cheaper generators alone may not be sufficient to supply the increased loads and hence expensive generators are also re-dispatched to respond to higher demands and this leads to higher energy prices. To overcome this situation congestion problem in the transmission system is addressed by installation of multiple FACTS devices and Distributed Generators (DGs). The optimal locations and ratings of the DGs and FACTS devices are estimated to reduce the power loss, cost of generation/DGs and to improve voltage profile from relieving congestion. This shows the superiority of the method suggested.
8.2 SCOPE FOR FUTURE WORK

In this proposed work, congestion management study is carried out for pool market using GA and EP techniques. The same problem can be extended to different market structure such bilateral/ multi-lateral markets.

In a large power system, Zones are classified based on PTCDFs and congestion is relieved using re-dispatch of real power of the generators in the severe zone. PTCDFs and QTCDFs can together be used to classify zones and congestion can be relieved by re-dispatch of real and reactive powers of the generators in the severe zone. If congestion is not relieved by re-dispatch of generators in the most sensitive zone, then the generators in the next sensitive zones are to be rescheduled.


[34] Papalexopoulos A, “Power system expansion planning and pricing in a deregulated environment”, in Proceedings of IEEE PES Summer Meeting, 3, pp. 1168-1172, 2002


