CHAPTER 6

CONCLUSIONS

6.1 CONTRIBUTIONS OF THE THESIS

The following conclusions have been drawn on the strategy suggested for FACTS placement problem in this thesis.

- BBO optimization method is a natural based optimization technique possessing the characteristics of PSO and GA which are also the natural based optimization techniques. A new BBO based algorithm for reducing the losses by placing multi-type FACTS devices at most appropriate lines has been developed. The algorithm determines the type, the locations and their parameters. Four different cases with different objectives have been considered in formulating the problem.

- In case-1, the objective has been built to minimize only the network loss. The simulation results have been found to clearly indicate that the proposed strategy effectively reduces the loss than that of GA and PSO based approaches for all the test systems considered. Owing to the fact that the constraint on voltage magnitude of load buses has been included in the *HSI* function as penalty terms, the solution ensures better voltage profile.

- The objective function has been developed to possess the voltage deviation of all load buses, which endeavors to bring all the bus voltages nearer to the nominal voltage of 1.0 per unit in case-2. The simulation results have been found to indicate that the proposed strategy provides improved voltage profile but slightly increases the network loss.

- The increase in loss has been controlled in case-3 through adding the loss terms in the objective function of case-2. This strategy has attempted to reduce the network loss in addition to improving the voltage profile.

- The objective function in case-4 has been altered to comprise VSI terms with a view to enhance voltage stability. The simulation results on all the test systems have been found to substantiate the enhancement in voltage profile besides ensuring VS and reducing the network loss.

- If the requirement is loss savings, case-1 may be used. case-2 can be used if the requirement of providing quality power supply. If both loss savings and quality power supply are the requirements, then case-3 may be considered. If voltage stability is important similar to loss savings and quality power supply, case-4 can be considered. It follows that the proposed formulation exploits the capability of BBO and will culminate it as a powerful tool in solving FACTS placement problem. The approach owing to its simple computations has been able to cater to practical implementation on systems of any size.

6.2 LIMITATIONS OF THE THESIS

The limitations of the methods discussed in this thesis are

- The loss expression considered in this thesis cannot be used for systems with TCPAR.
- The number of FACTS devices cannot be varied in the proposed formulation.

6.3 SCOPE FOR FUTURE RESEARCH

The present study has opened up new avenues for further research in the following direction.

The other FACTS devices such as STATCOM and SSSC may be considered in an attempt to provide a greater scope for enhancing the system performance.

Hybrid algorithms involving the classical and evolutionary methodologies may be used to solve the FACTS placement problem in order to explore new search regions with a possibility of landing at a better solution point.