Chapter 8

8. Conclusions and future scope

8.1 Research Outcome

The research work was concluded with following milestones:

1. A technique for control of 1ph. D-STATCOM using constant dc bus voltage and SHE PWM controlled VSI with low switching frequency.

2. An easy-to-implement technique for on-line solution of SHE PWM equations.

3. Procedure for selecting optimum values of passive components of 1ph D-STATCOM.

4. Validation of the proposed technique by means of computer simulation and practical trials.

5. A novel method for reference current generation for 1ph. SAF using SSI.


7. Validation of results using computer simulation of 1ph SAF.

8.2 Conclusions

In this research work, design, analysis and implementation of single phase D-STATCOM and indirect current controlled SAF have been discussed. The performance of the simulated model of the 100kVAR single phase D-STATCOM and 20kVAR D-STATCOM prototype are in close agreement.
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The response time is 3 to 4 cycles. Elimination of the low order harmonics (3\textsuperscript{rd} to 23\textsuperscript{rd}) is confirmed by harmonic analysis of the D-STATCOM current. The switching frequency is 2.4 KHz. The distortion in the D-STATCOM injected current is well below the limits prescribed in IEEE-519-1992. The ripple in the dc bus voltage is less than 5\%. The active power loss is observed to be 25W/kVAr.

A technique based on SSI has been proposed for indirect control of SAF. Because of indirect control of SAF, there is no need to evaluate harmonic component of load current and a low band width current sensor such an ordinary current transformer can be used to sense the supply current. Use of SSI enables generation of orthogonal component needed for IRP theory without any delay elements and less computational burden. The method offers correct determination of reference current in presence grid voltage distortions. Design of single phase SAF of 240V, 20kVA rating using direct and indirect control based on SSI is presented.

### 8.3 Suggestions for Future work

The future avenues of the research work could be on following directions,

1. Practical realization of large capacity 1ph D-STATCOM (600 Kvar) by parallel implementation using 75kVAR modules as shown in Fig.8.1. This is the configuration used for a typical TSS

![Figure 8-1: Parallel implementation of D-STATCOM Modules for larger capacity](image)
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2. Enhancement in response time, detecting instantaneous reactive power of single phase D-STATCOM.

3. Practical realization of small rated 1ph. SAF for LT loads based on the SSI technique.

4. Optimization to reduce per kva cost of the power electronic hardware used for SAF.