CHAPTER 6
CONCLUSION

6.1 GENERAL

It is widely accepted that power modulators coupled with innovative control strategies alone can pave the way for nurturing newer applications. It has been substantiated that switching strategies play a vital role in facilitating the modern power electronic converters to perform with acceptable values of performance indices.

The power system in general is accomplished with ac loads to a large extent. The available techniques have not enabled the system to meet the desired levels of performance. Hence, there has been a continuous focus to design and develop purposeful algorithms that can be instrumental in ideally interfacing the power supply with the load. It is in this direction that a greater emphasis has been laid on developing switching patterns for ac output converters. A review of the literature has made the author to generate newer carrier functions besides building innovative strategies that have contributed not only to enhance the performance of the converters but also served to improve the power quality.

The two new control techniques, HWSVFAM and QWSVFAM that exploit the symmetry of the output voltage waveform have enabled an enhanced fundamental, lower THD and served to minimise lower order harmonics especially in the low output voltage range of a single-phase to single-phase cycloconverter. The QWSVFAM has been designed in such a way that it has served to offer unity input displacement factor, independent of the firing angle. It is for the first time that expressions relating the input and output side indices have been established.

The significant feature of the newly generated carrier function ISCPWM is that it has contributed to offer a higher output voltage in the lower modulation index region, with reduced THD while both ISCPWM and AMTCPWM have enabled a single-phase full-bridge inverter to adopt a consistent strategy for the entire range of modulation
index. The AMTCPWM has served to extend the linear range of operation of a conventional SPWM. The ability of being able to modify the carrier function has been the prime reason for MCPWM to compensate the voltage drop that may arise due to changes in load.

Most of the present day inverter systems have been forced to work in a distorted dc input environment. The consequent increase in the size of filter components may result in an increase in the inverter as well as load current; besides the series element in the filter causing a decrease in the load voltage due to an increased drop across it. It may inadvertently lead to de-rating the system components. The newly developed area equalisation based PWM strategy has contributed to reduce the switching losses of the single-phase full-bridge inverter besides having enabled it to perform satisfactorily with fluctuating inputs.

The significant need to reduce the component count in the configuration of a multilevel ac-ac system has been responsible for the author to come up with a new variety of MLDCL. It has been amply illustrated that the AEPWM control techniques when used in the new CSMLDCL inverter, has allowed uniform use of the switches, enjoy reduced lower order harmonics, switching and conduction losses.

6.2 SCOPE FOR FURTHER WORK

The role of the switching strategy governs the performance of any power electronic converter to a considerable extent. The recent innovations in PWM techniques have paved the way for realising the desired excellence in electrical utilities besides serving to improve the power quality. The advancements in hardware technology offer a wide scope for extending the horizon of applicability of newer control methods in existing/innovative converter topologies.

(i) It may be necessary to incorporate a procedure by which the angles (that are related with the output voltage) can be optimized, especially for higher values of $K_r$. 

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(ii) It will be interesting to explore the effects of AEPWM strategies in a forced commutated cycloconverter systems.

(iii) The benefits of AEPWM strategies in an ac chopper are to be investigated.

(iv) The closed loop performance of a cycloconverter with inductive loads, besides the role of intelligent controllers can be analysed.

(v) Newer carrier functions can be generated, which may serve to meet application specific requirements in ac-ac systems.

(vi) The suitability of the proposed carrier functions based inverter system for variable speed ac drives can be brought out.

(vii) The merits of MCPWM can go a long way in developing a state-of-the-art UPS systems for sophisticated real time application.

(viii) There is a compelling need to devise a way by which the depth of utilisation of dc bus can be imbibed in the area equalisation method, which will enable an inverter working in the fluctuating dc environment to better meet the requirements.

(ix) An artificial intelligence (AI) based AEPWM approach can be thought of for multilevel inverters to further enhance its performance.