CHAPTER 7

CONCLUSION AND FUTURE SCOPE

7.1 CONCLUSION

This thesis has elaborated the fact that the proposed capacitive converter can provide better performance than traditional converter. This topology leads to improve the average torque, smooth speed control and reduced torque ripple. The basics, construction, working principle, operation, frequency variation of inductance, energization design and mathematical modelling of Switched Reluctance Motor (SRM) is discussed in chapter 1.

The torque response of SRM with different converter topologies are described in chapter 2. From the comparison results it is known that the current through the phase winding of SRM fed from different converters are more distorted than an asymmetric bridge converter. Due to this, the torque developed by SRM had more ripple than fed from the asymmetric bridge converter. The simulation results revealed that the asymmetric converter is the most suitable configuration of drive topology of SRM.

A new soft switched boost converter for a SRM developed with a new passive snubber cell. The proposed circuit gives the regulated DC voltage of 240 V to the SRM phase winding. The chapter 3 shows the performance of SRM with regulated voltage. The performance characteristics of SRM with proposed soft switched converter are similar to that of conventional asymmetric converter. In order to regulate the input voltage to the SRM, the
boost converter is incorporated to the front end of asymmetric converter which will make the system at high cost.

The front end converter topologies of SRM are described in chapter 4. A new modified SRM drive has been presented in this thesis. The present work consists of one boost capacitor and two diodes in addition to the conventional converter. The proposed circuit deals with high magnetization and demagnetization voltage of the motor phase. The proposed converter obtains faster excitation current during magnetization and faster demagnetization current during the demagnetization period when compared to the author Liang et. al (2010). So it is improved the current tracing effect, average torque and also reduced torque ripple. In addition, the cost of the proposed converter is lesser when compared with the conventional passive boost converter. Moreover, it’s simple structure and easy installation seems to be the additional features of the proposed converter. The operational modes of the proposed converter are analyzed in detail.

The performance of SRM is investigated by varying switching angle and applied voltage in chapter 5. The voltage applied to the motor is increased, to increase the motor current and motor torque. When the switching angle is increased, the efficiency of the motor also increased. This chapter concludes with the proper selection switching angle and input voltage which improves the motor performance.

The speed control of SRM with proposed capacitive converter by a hysteresis current control based PI controller is presented in chapter 6. In this thesis, proposed converter fed SRM based speed control is implemented in real time for various operating conditions such as motor start up, steady and various load conditions. In order to verify the performance of the proposed converter, some experimental results have been obtained. The experimental results demonstrated the effectiveness of the proposed converter using a PI
controller with various working conditions of the SRM. This research work concludes that the proposed front end capacitive converter fed SRM is feasible and practically achievable.

7.2 FUTURE SCOPE

It will be possible to work out active topologies of SRM in the future. In proposed network, the average torque was improved and reduced torque ripple compared to other topologies. But the topology still having ripple in torque. It can be minimized with advanced control technology. By proper selection of switching angle of SRM drive, the current behavior in phase windings will be controlled and hence it can minimize the ripple. The online or dynamic control implementation using the proposed converter can be an interesting area of research. The online control itself requires complex control, but if it is incorporated with current control strategy and proposed converter then results can be achieved, which would be more realistic.

The advanced control technologies like intelligent control may be applied to the proposed converter fed SRM. The proposed converter fed SRM can be implemented in applications like electric vehicle, electric traction and aerospace.