CHAPTER 9

CONCLUSION AND FUTURE SCOPE WORK

9.1 CONCLUSION

Power electronics, digital control, computer-aided design, and new technologies have earned the induction motor the new sobriquet of “the race-horse of industry” in addition to the earlier one of “the workhorse of industry". Present in all industries and in home appliances in constant and variable speed applications.

A systematic approach of achieving speed control of an induction motor drive by means of various types of control strategies has been investigated in this thesis work, titled “A brief literature survey on the work done by various researchers around the globe on the current topic till date” has been presented in the introductory chapter along with the problem definition. Modeling of the IMs was dealt in further chapters. Four control strategies, viz., PI, Mamdani-based FLC, Takagi–Sugeno-based FLC and the ANFIS control scheme, were considered for designing the controller in order to control the speed of the IM. Finally, the best suited control strategy for power industrial drives was selected in the current scenario. Various stages were considered in arriving at the design of the sophisticated ANFIS controller for controlling the speed of IM drives in this thesis work.

It has been started with a basic model, viz. PI-based controller. Then a controller based on Mamdani FLC model is presented and the

results are analyzed, which is compared with the PI Model and concluded that Mamdani FLC is superior to the conventional PI controller. Next, a Takagi–Sugeno-based FLC was designed and compared with the previous models. The simulated result clearly leads to the conclusion that the TS-based fuzzy controller is able to provide better performance in the speed control action of the IM while comparing the earlier. At last a proposed controller, viz., the Adaptive Neuro-Fuzzy Controller (ANFIS) is designed and simulated in Matlab/Simulink. By observing the simulation results, reveals that proposed method (ANFIS) delivers excellent controlling action while controlling the speed of Induction motors.

9.2 FUTURE WORK

Research is endless. The work done in this thesis could be further researched upon and extended by considering various other sophisticated advanced simulation tools, both in the hardware and in the software levels.

The developed control strategy is not only simple but also reliable and may be easy to implement in real-time applications using some interfacing cards such as the dSPACE, Data acquisition cards, TMSDSP cards, NI cards, etc. for control of various parameters and can also be combined with fuzzy, ANNs and rough sets for other applications. Genetic algorithms combined with fuzzy and neural networks can be considered a future entity.

Speed control of IMs using sliding mode control, model predictive control and multirate output feedback control strategies such as the periodic output feedback and fast output sampling feedback could also be used. Fault tolerant strategies can also be used as one of the options for checking robustness issues in speed control. The robustness of the proposed controllers could be further investigated using simulation studies for various parametric changes/variations. One of the robust control techniques, viz., the H_∞ control scheme, could be used as one of the future options along with hybrid controllers.