CHAPTER 7

CONCLUSION AND SUGGESTION FOR FUTURE RESEARCH

7.1 CONCLUSION

In the analysis of many systems for which the physical laws are well known, one is frequently confronted with problems arising from the high dimensions of descriptive state model, the famous curse of dimensionality. The reduction of such high order systems (also termed as large scale systems) into low order models is one of the important problems in control systems engineering and hence the analysis, synthesis and simulation of practical systems assumes a greater significance.

The mixed model order reduction techniques proposed in this thesis gives better approximated reduced order model for the given higher system. The reduced order system performs close to the higher order system response. This result in reduction of design cost, system complexity etc., and also preserves steady state value and stability in the reduced order model. This thesis focuses on the reduction of interval system and it minimizes the complexity involved in direct design of PI Controller. The approximate values for PI Controller parameters are calculated from the reduced order model and suitably tuned to meet the required performance specifications using genetic algorithm optimization technique. The tuned values of these controller parameters are used with the original system and its closed loop response is observed.

The thesis further attempts to formulate a mathematical model for an inverted pendulum system for direct design PI controller. The proposed model order reduction technique is employed to obtain the second order model of the systems and further reduces to first order system using cross multiplying technique. The
compensated system is cascade with original system and auto tuned using sisotool. The outcome results are simulated using MATLAB.

7.2 SUGGESTIONS FOR FUTURE RESEARCH

In this thesis, a mixed model order reduction method was used to design the PI controller for Interval system. Based on the proposed method attempts to robust stabilize an inverted pendulum system was done to improve the closed loop response design. Few suggestions and recommendations are given below for future research in this area.

- It will be used for the controller design of other motor drives such as Switched reluctance motor drives, chopper fed DC motor drives and brushless DC motor drives etc.,
- Instead of using genetic algorithm optimization technique for tuning the controller coefficients, hybrid optimization techniques such as GA-PSO, Fuzzy-GA, Neuro-fuzzy-GA and PSO-DE can be used.
- One of the more important areas in control is stability. Based on the outcome more work can be done in improving the robust stability of the controller.
- This technique can be extended to reduce the computational burden in terms of memory and speed during the simulation of electrical models.