CONCLUSION AND FUTURE WORK

This work was undertaken to develop Multiple Interactive Tank Processes through the use of various controllers. Simulated results have shown that parameters are adequately calculated and chosen. Control algorithm leads the system to desired reference output without any deviations even when restrictions are placed due to its operation in both phase conditions. Stability is achieved using PID, CDM, MPC and NMPC controllers. Control algorithm is developed for Multiple Interactive Tank Process. These controllers exhibited significant performance in obtaining steady state output with respect to set point. Complexity of all process models was handled implicitly and steady state conditions for step response are compared for minimum and non minimum phase conditions. A compensator was additionally required when PID and CDM controllers are used for non minimum phase condition of SISO sub system for obtaining the desired set point.

Elaborate tuning methods were designed and applied for Multiple Interactive Tank Process when MPC controllers were used. Different conditions and constraints were applied for linear and nonlinear model. Feasibility and stability was obtained even for short control horizons guaranteeing that the output reaches the reference point. When prediction horizon is long, it helps to reduce aggressiveness. Necessary condition for stability is that $P \gg M$.

The usage of MPC and NMPC was found to deliver smooth response under all tuning parameters. NMPC is a more advanced technique to handle multivariable interactive control loop process parameters. Results show that a nonlinear model predictive control algorithm is developed which performs satisfactorily. Finally transient and steady state responses have been obtained in all cases.

There is some interesting work that still remains to be done. It would be interesting to test the controllers in a physical plant and carryout further investigations to reduce delay response time.
It would be interesting to find other types of tuning methods and optimize controller performance that reduces the delay time while maintaining precision. Ways of reducing the delay time are of great interest to both academicians and to industry. A method worth considering would be to stop the search algorithm for optimization when the total current cost of objective function is less than that of initial one.