ChE381A: Process Dynamics and Control

Simulation Assignment 7

Smith Predictor Design

Two SISO processes with difficult dynamics are provided to you. Process 1 has large dead-time while Process 2 has large dead time and inverse response.

Tune conventional PID controllers for the two processes. The tuning parameters are chosen to minimize the ITAE (integral time) for the unit step servo response. Plot the unit step servo and regulator responses for the recommended tuning.

Design and tune a Smith-Predictor. The controller in the Smith predictor is PID. To design the Smith predictor, you will need to develop a reasonable model for the open loop plant response. Develop such a model and show the goodness of fit of the predicted model response on a neat plot. The PID controller in the Smith predictor is tuned to minimize the unit step servo response ITAE. For the recommended Smith predictor system, obtain the unit step servo and regulator responses and compare the tightness of control achieved with conventional feedback control.

Submit a brief report on the exercise.