CHE 442

PROCESS CONTROL LABORATORY

This lab. emphasizes theoretical concepts of open and close loop runs on liquid level and liquid temperature. The students carry out open-loop experiments on liquid level and liquid temperature investigating their dynamic behaviour and determining their characteristics to be used in control parameters design and implementation. The students will present their work and results in formal written report.

Text book: laboratory manual

Reference: Chemical process control by George Stephanopoulos

Co-coordinator: Professor Abdulrahim A. Alzahrani

Goals

To reinforce the students understanding of dynamic behaviour of different processes and its relation to controller design and implementation.

Prerequisite Topics

1- Data acquisition and control

2- Statistical methods

Topics

A) OPEN LOOP EXPERIMENTS

1- Dynamic behaviour of liquid level in one tank.

2 - Dynamic behaviour of liquid level in two consecutive tanks.

3-Dynamic behaviour of liquid temperature in plate exchanger.

4- Dynamic behaviour of pure capacity process.

B) CLOSE LOOP EXPERIMENTS

Demonstration of control system components and controllers types P, PI, PID and implementation of control parameters designed by the student for:

1 - Liquid level in one tank.

2 - Liquid level in two consecutive tanks.

3 - Liquid temperature in plate exchanger.

Computer Usage

In future data acquisition and control interface will be used for controlling the previous and new processes.

Laboratory Facilities

The lab. is sited in Building45 Room114 with total area 50 m . The equipment available meets the minimum academic needs for course CHE 412.

EXPERIMENTS

A) OPEN LOOP EXPERIMENTS

1 - Dynamic behaviour of liquid level in one tank {First order system}.

Objectives:

- Studying liquid level process in one tank and determining its characteristics.

- Investigating the concept of self-regulating processes and physical constraints.

2 - Dynamic behaviour of liquid level in two consecutive tanks.

Objectives:

- Studying the dynamic behaviour of a second order system and determining its characteristics.

3 - Dynamic behaviour of liquid temperature in a plate exchanger.

Objectives:

- To be able to model the process.

- Studying the dynamic behavior of liquid temperature to changes in inputs.

4 - Dynamic behaviour of pure capacity process

Objectives:

- Studying dynamic behaviour of the pure capacity process

- Studying the concept of non-self regulating process.

B) CLOSE LOOP EXPERIMENTS

Objectives:

- Demonstration of different types of controllers P, PI, PID

- Implementation of the student designed controllers.

Three experiments are to be carried out on:

1 - Liquid level in one tank

2 - Liquid level in two consecutive tanks.

3 - Liquid temperature in plate exchanger.