PID CONTROLLER USING ZIEGLAR-NICHOLS AND CHIEN TUNING PROCESS FOR LIQUID LEVEL CONTROL OF COUPLED TANKS SYSTEM

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ABSTRACT

Nowadays, industries such as petroleum, petrochemical industries and drinking water industries like Petronas and Coca Cola are the essential industries where liquid level and liquid flow need to be controlled. This paper proposes the PID (Proportional Integral Derivative) controller on the coupled tanks system that allows controlling the liquid level in the second tank or tank 2. The flows between tanks also need to be considered in the presence of nonlinearity and inexact model description of the plant. The proposed of PID controller in this paper is to get the best settling time for steady state error elimination to reach its set point or desired liquid level by using Zieglar-Nichols and Chien tuning process technique. The appropriate control signal is produced by simulation studies based on the developed model using MATLAB and SIMULINK.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.1 Overview

In the new era of technology, a lot of major manufacturing and chemical process industries have been using PID controller in the automatic control system since 1940s. Since then, it has evolved from a pneumatic mechanical to a digital electronic device. Today, PID controllers has incorporated with the new control strategies such as model based control, fuzzy logic control, dead time compensation and variable gain adjustment to accommodate for non-linear and longer dead time processes. Current digital PID controller is governed by a mathematical expression known as the control algorithm, which can be represented by the expression below [1]:

$$MV = \frac{100}{P}\left\{e + \frac{1}{I}\int edt + D\frac{de}{dt}\right\} \tag{1.1}$$

$$MV = Kc\left\{e + \frac{1}{I}\int edt + D\frac{de}{dt}\right\} \tag{1.2}$$

Where, MV is the manipulated variable.