**Study of the behavior of a (second order) system: level control by means of a valve**

The goal of this laboratory experiment is to look at the behavior of a first order system. The controller, programmed in a Siemens PLC controller, will control the level by means of a **valve**.(lecture notes chapter 2)

You change the P,I and D value in the program and look at the parameters involved, namely overshoot, settling time, offset and stability. Also the reaction of the valve is important.

As explained in the theory we have

P: Proportional ~ Stability

I: Integrator ~ Precision (offset)

D:Differentiator ~ Speed

You have to look at how the system reacts if you change these values. You also look at how the actuator, in this case the valve, reacts when you change these values.

1. changing P

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| P | I | D | stability |  | response time | overshoot | valve |
| 1 | 0 | 0 |  |  |  |  |  |
| 5 | 0 | 0 |  |  |  |  |  |
| 10 | 0 | 0 |  |  |  |  |  |
| 20 | 0 | 0 |  |  |  |  |  |
| 50 | 0 | 0 |  |  |  |  |  |
| 100 | 0 | 0 |  |  |  |  |  |

1. changing I

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| P | I | D | stability |  | response time | overshoot | valve |
| 5 | 1 | 0 |  |  |  |  |  |
| 5 | 5 | 0 |  |  |  |  |  |
| 5 | 10 | 0 |  |  |  |  |  |
| 5 | 20 | 0 |  |  |  |  |  |
| 5 | 50 | 0 |  |  |  |  |  |
| 5 | 100 | 0 |  |  |  |  |  |

1. changing D(PD)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| P | I | D | stability |  | response time | overshoot | valve |
| 5 | 0 | 1 |  |  |  |  |  |
| 5 | 0 | 5 |  |  |  |  |  |
| 5 | 0 | 10 |  |  |  |  |  |
| 5 | 0 | 20 |  |  |  |  |  |
| 5 | 0 | 50 |  |  |  |  |  |
| 5 | 0 | 100 |  |  |  |  |  |

1. changing D(PID)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| P | I | D | stability |  | response time | overshoot | valve |
| 5 | 5 | 1 |  |  |  |  |  |
| 5 | 5 | 5 |  |  |  |  |  |
| 5 | 5 | 10 |  |  |  |  |  |
| 5 | 5 | 20 |  |  |  |  |  |
| 5 | 5 | 50 |  |  |  |  |  |
| 5 | 5 | 100 |  |  |  |  |  |

1. Some more observations (valve)
2. What are your conclusions.