EGR – 550 MECHATRONICS SYSTEMS

PROJECT - 2

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Objective:

Finishing heater 1 lab and fitting the First Order Plus Dead Time (FOPDT) model

Approach:

The live script test Models. Mat is executed, and the Arduino and temperature control lab are connected to the PC. There are 800 seconds in the script. The data and graphs of the control lab's input and output are displayed. The input is the step response of the heater. The thermistor outputs the temperature (T1) that was measured.

$$\tau_p \frac{dy(t)}{dt} = -y(t) + K_p u(t - \theta_p)$$

The FOPDT model is given by:

In addition to y(t) and u, the equation also incorporates unknown variables (t).

Tp = Time constant throughout the process.

θp = Dead time during the process

Kp, = Gain in the Process

Based on the plots we first got, it is possible to determine the unknown parameters. The computed parameters are adjusted in this stage, after which the TC lab is conducted. The predicted model's correctness is evaluated based on the comparison between the output plot that was produced and the actual data.

Output & Conclusion:

We can model FOPDT with a high degree of accuracy by adjusting Kp, TauP, p, Tss, and Qss.

Kp = 0.5

TauP = 120

θp = 10

Tss = 23

Qss = 0

The FOPDT code is modified to use the above-mentioned settings, and Figure 1 compares the expected and actual model outputs.

Figure 1 illustrates how well the projected model matches the real model. This demonstrates that the FOPDT model may be applied to fit the heater model in question. By taking the readings more precisely, it is possible to further improve the anticipated model's accuracy.

Fig - 1. Modelling and Comparison of FOPDT, Energy Balance Model