

# AERO\_2DOF PROBLEM STATEMENT

EE-615

## 1 Objectives

- Design two PID controllers in SIMULINK to separately control pitch and yaw.
- Design PID gains according to the following set of specifications:
  - 1. Peak time:  $t_p \leq 2.5s$  for pitch angle and  $t_p \leq 3.5s$  for yaw angle.
  - 2. Percent Overshoot:  $PO \leq 5\%$  for both axes
- Design a low pass filter if there is noise in system.

### 1.1 NOTE

1. You can go through the *aero2\_2dof\_pd\_control* and *aero2\_2dof\_modelling* pdfs to derive the second order transfer function.
2. In the folder there are 2 *slx* files. You need to first use the *simulation.slx* file to create your PID controller and verify the simulated step response. If that response is good enough you can open the *hardware.slx* file and use that same PID controller to check the step response of hardware.

## 2 Model specifications

$$J_p = 0.0232$$

$$D_p = 0.0020$$

$$K_{sp} = 0.0074$$

$$J_y = 0.0238$$

$$D_y = 0.0019$$

$$K_{pp} = 0.0032$$

$$K_{py} = 0.0014$$

$$K_{yp} = -0.0032$$

$$K_{yy} = 0.0061$$

$$D_t = 0.1674$$