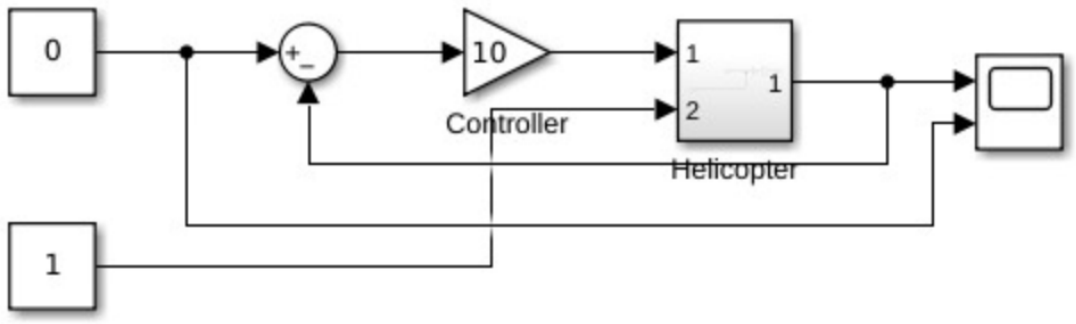
Embedded Assignment 1

Name : Chandrabhushan Reddy
Roll Number : 200101027

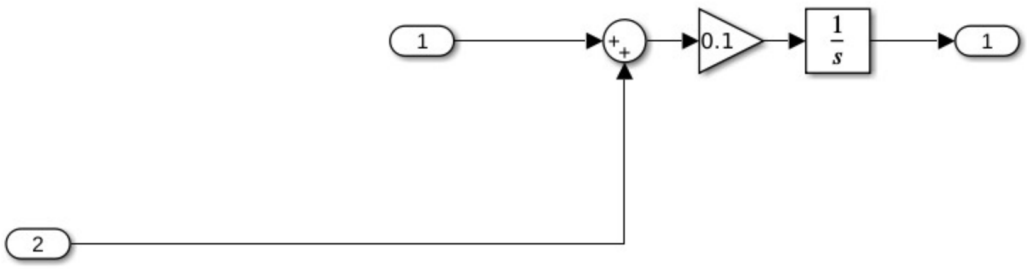
Results for 7a:

Assumptions: b = 1 and Iyy = 10

Model:

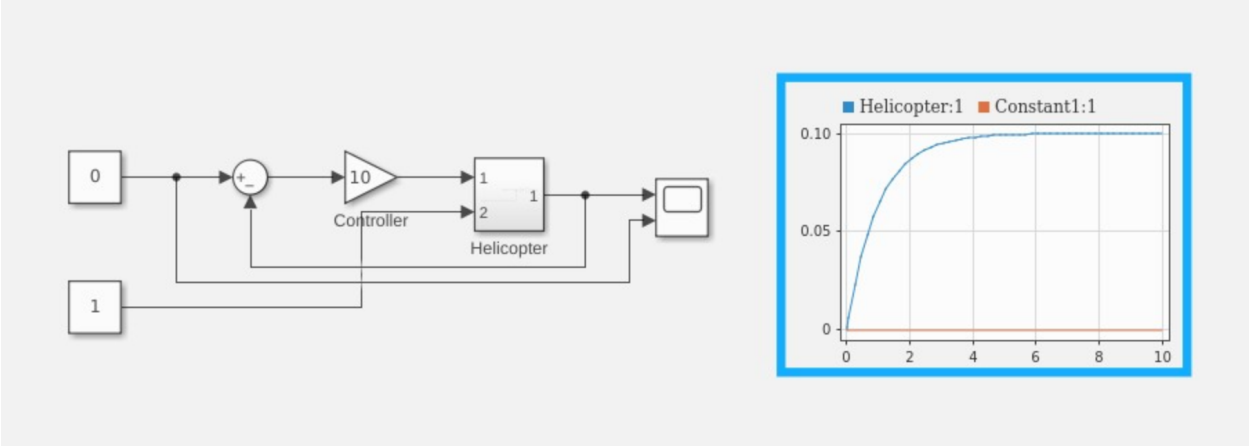


Helicopter Model:

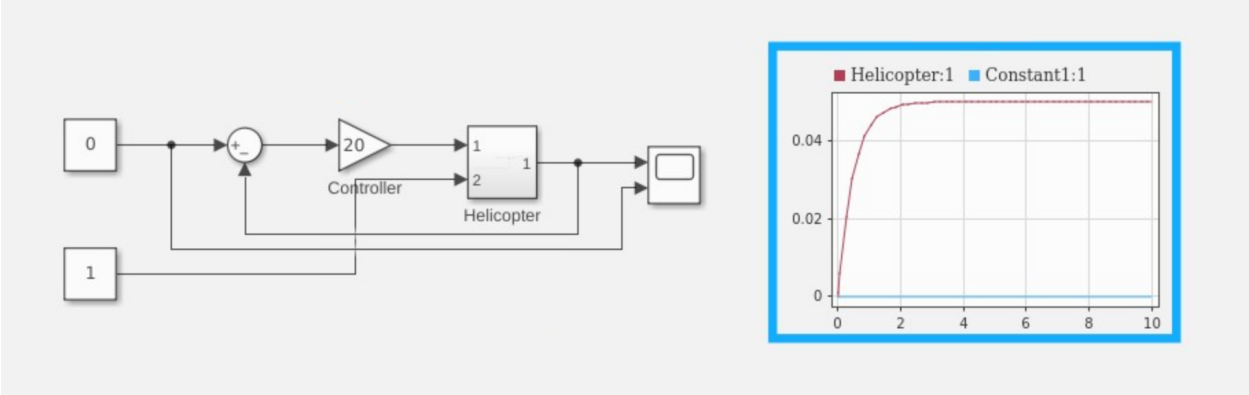


Simulation Results:

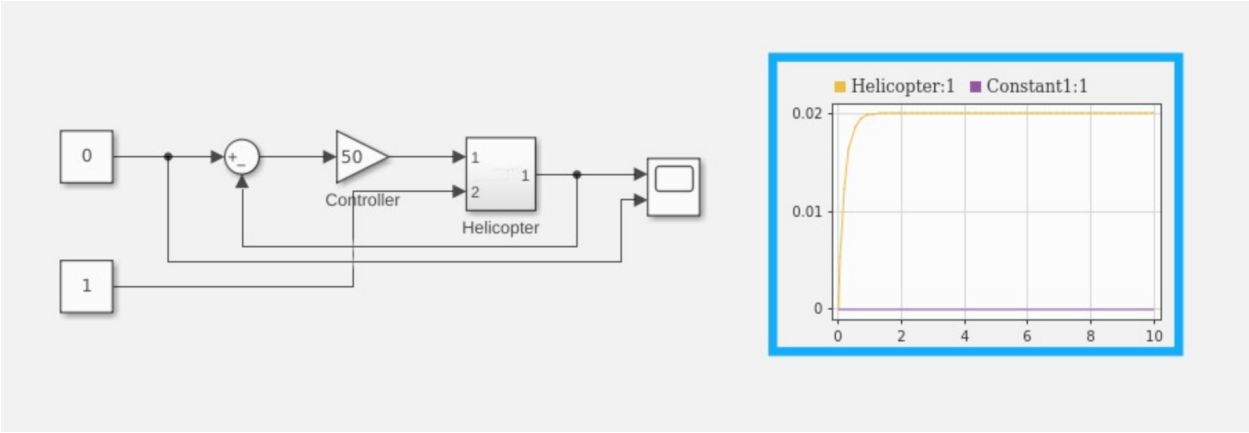
i) k = 10:



ii) k = 20:



iii) k = 50:



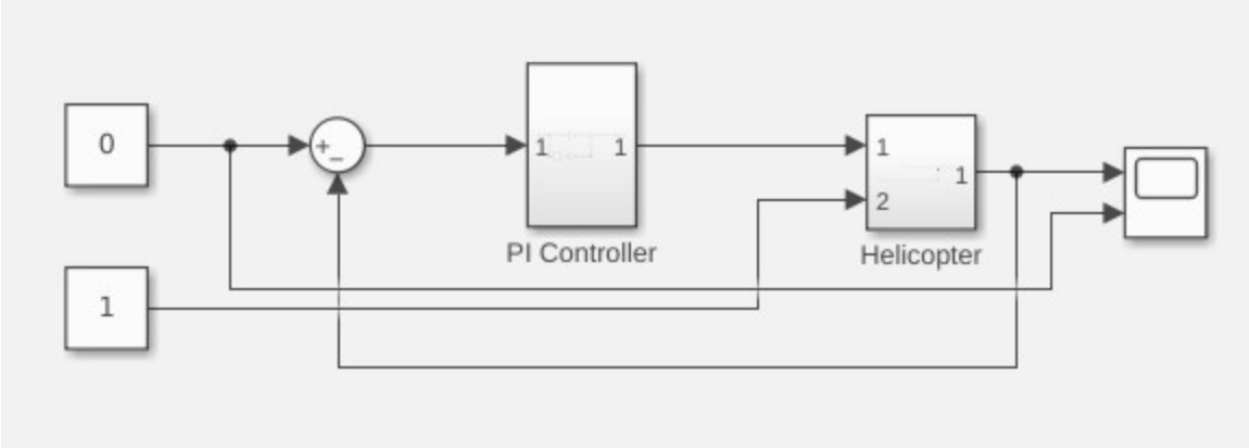
Observations:

- It can be observed that the angular velocity is eventually reaching a steady value of b/k.
- So, as the value of k increases, the value where the angular velocity settles, decreases.

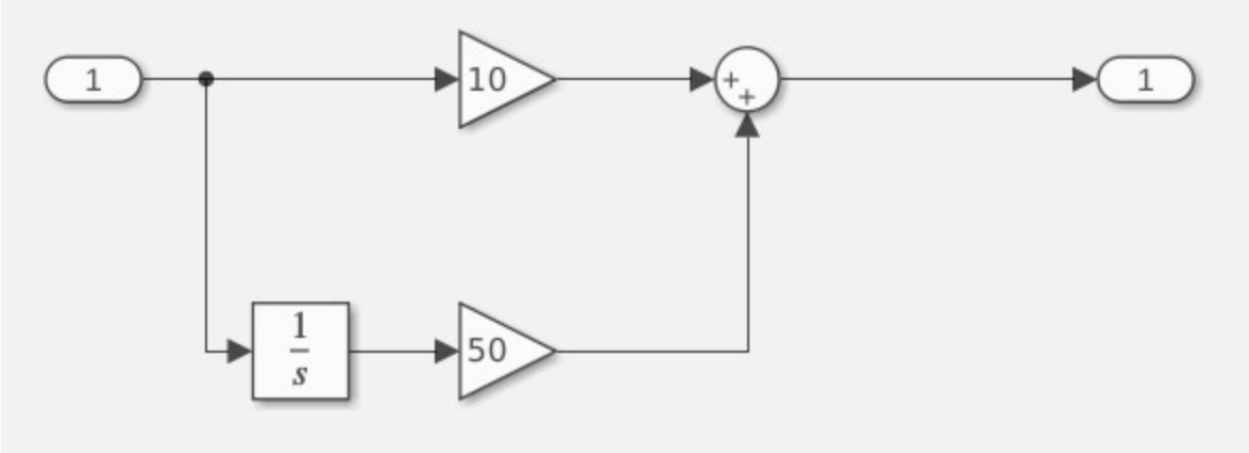
Results for 7b:

Assumptions: b = 1 and Iyy = 1

Model:



PI Controller Model:

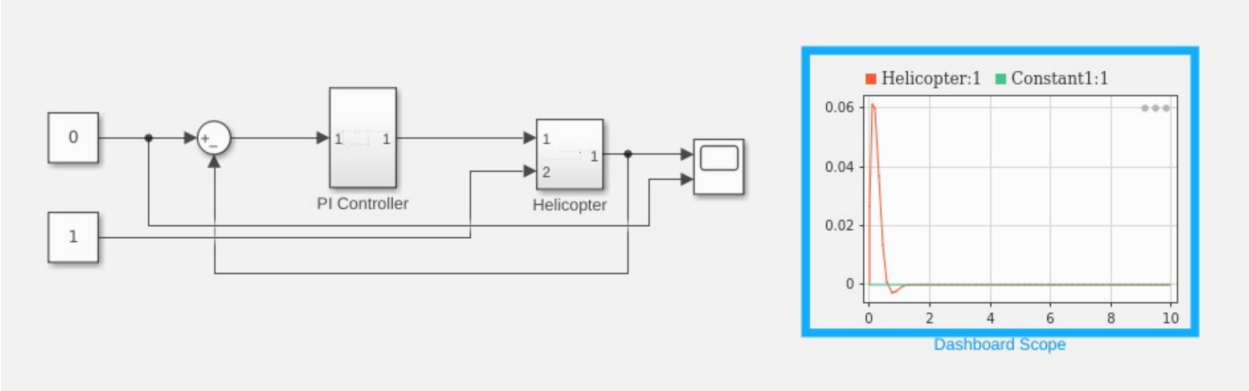


Helicopter Model:

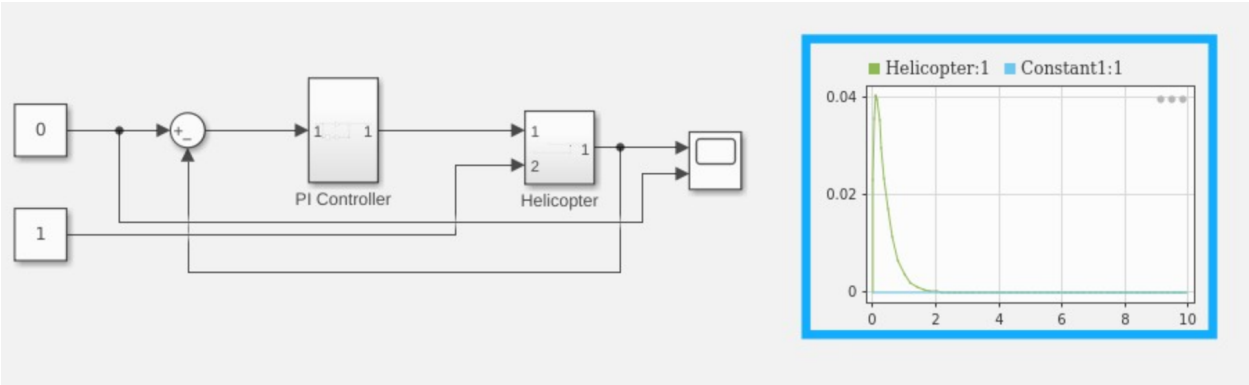
Simulation Results:

a) Increasing k1:-

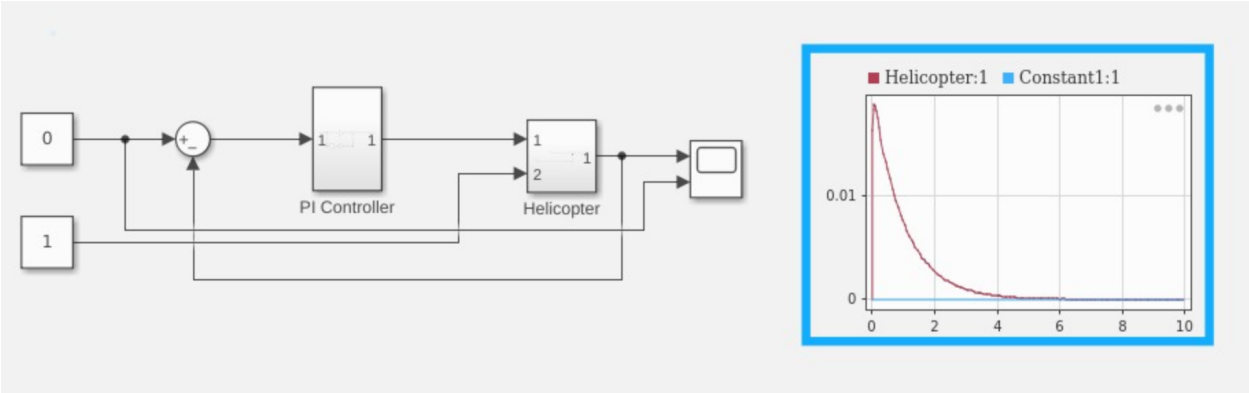
i) k1 = 10, k2 = 50:



ii) k1 = 20, k2 = 50:

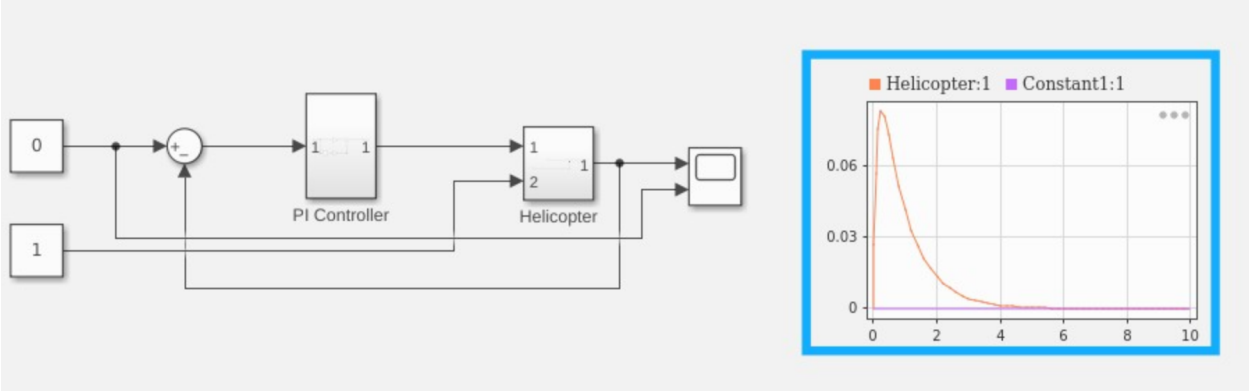


iii) k1 = 50, k2 = 50:

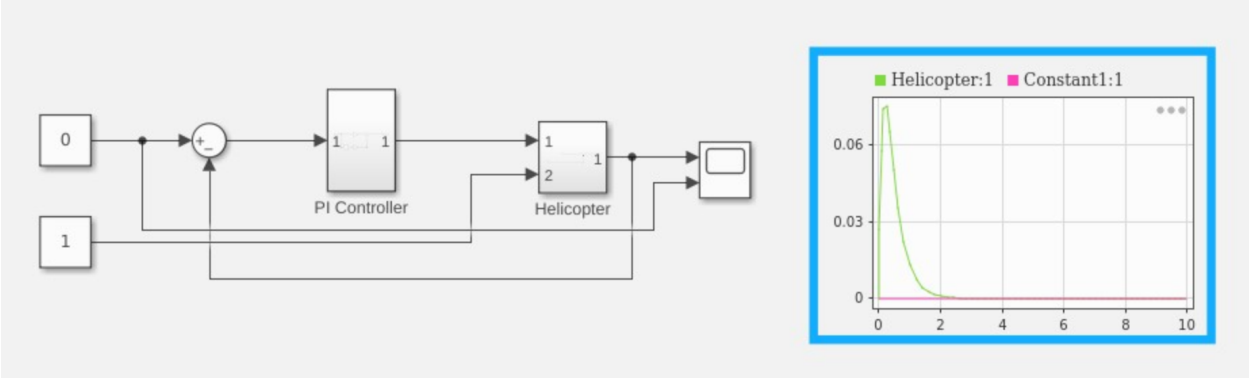


b) Increasing k2:-

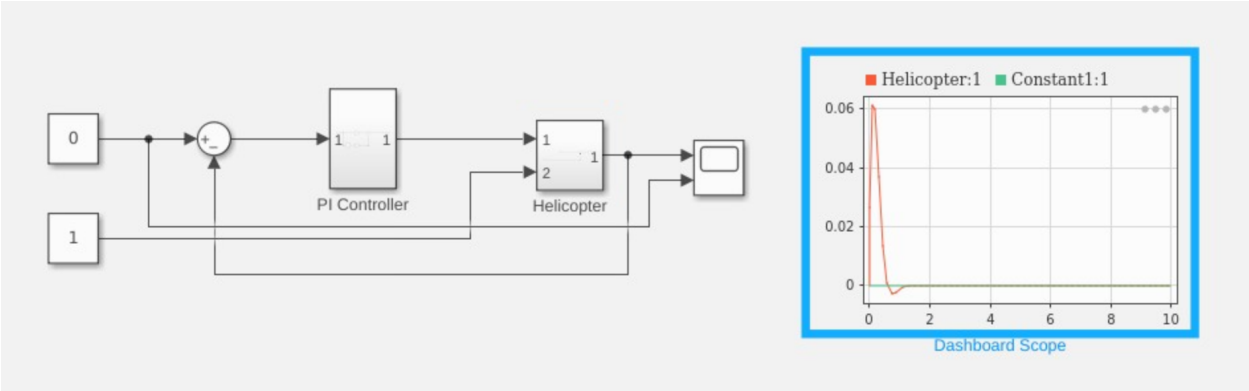
iv) k1 = 10, k2 = 10:



v) k1 = 10, k2 = 20:



vi) k1 = 10, k2 = 50:



Observations:

- As we can observe from the above graphs, when we use PI controller instead of a simple gain controller, the angular velocity of the helicopter eventually reaches zero.

- From simulation results i,ii and iii we can observe that as we increase the value of k1, keeping k2 constant, the angular velocity's peak value decreases and the angular velocity's settling time increases.

- From simulation results iv,v and vi we can observe that as we increase the value of k2, keeping k1 constant, both the peak value of angular velocity and the settling time of angular velocity decreases, although it may overshoot zero sometimes.