



Figure 1: Back to helicopters

1. Open the helicopter file you worked on last time, save it as a new file and remove/change and add a disturbance on the input of amplitude -1 (effect of a constant wind on the plant).
2. Implement a (continuous-time) state-feedback with integration within your Simulink file.
3. Use the cmd `lqi` to tune both gain matrices K and K_I so that the controller reject the disturbance and stabilize the system around the origin. What is the amplitude of the input in steady-state? What does it correspond to?
4. Modify the previously-obtained controller stabilize the helicopter longitudinal velocity back to around a velocity of 10 m/s.
5. Re-implement the previous controller digitally: first discretize the plant using the `c2d` command with sampling time $10T_s$. Secondly, obtain the discrete-time controller gain using the same `lqi` command. In your implementation, remember to include zero-order hold blocks to represent digitalization.
6. What is the influence of the initial condition in the integrator of the controller?