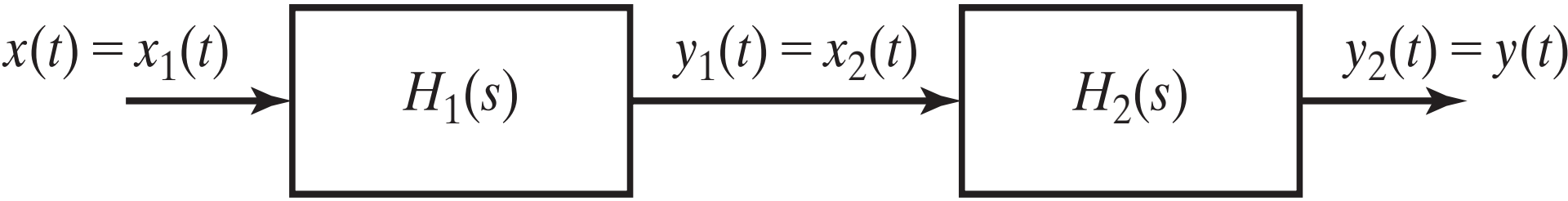
Observers for state estimation

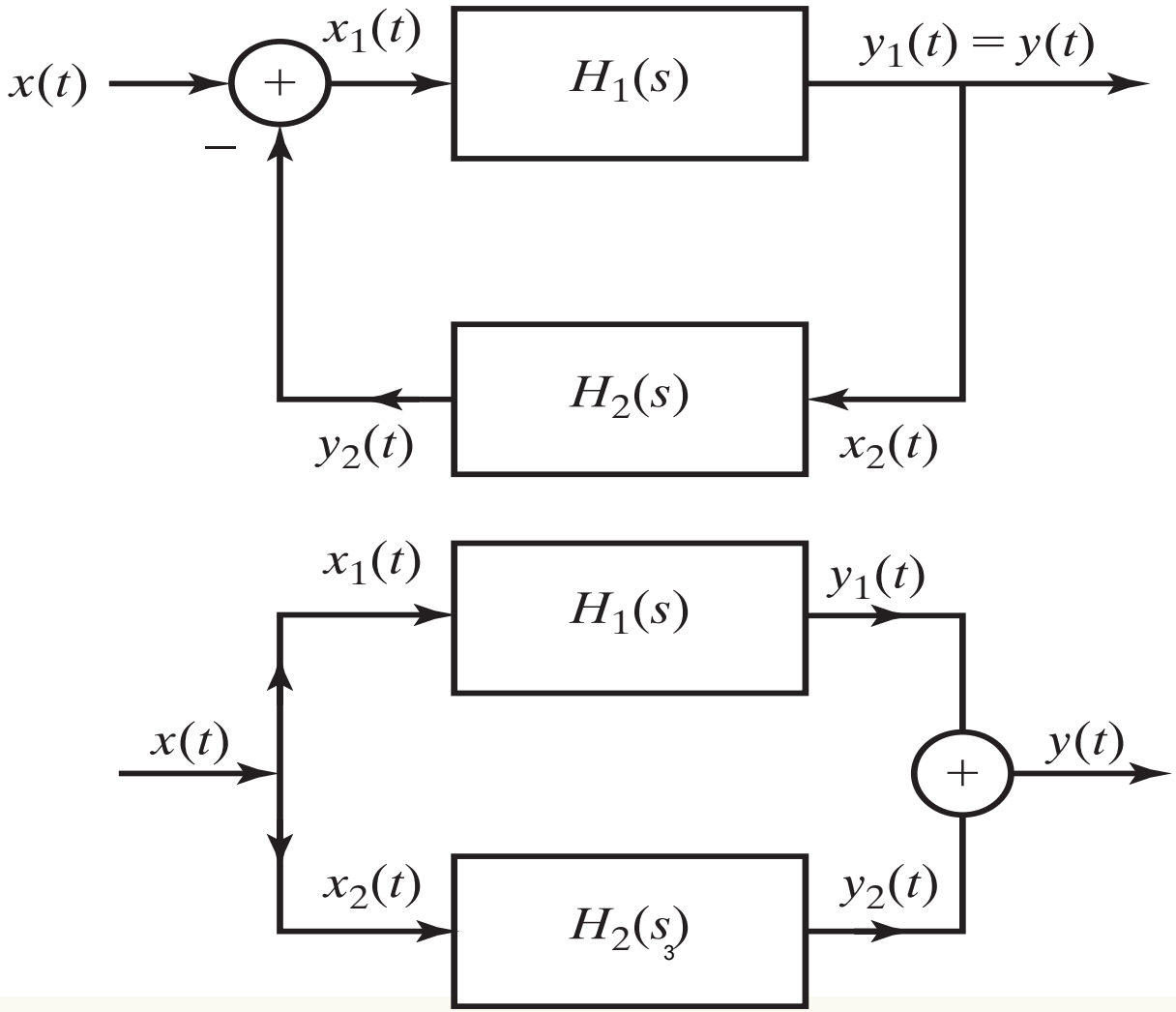
6.011, Spring 2018

Lec 9

Hidden modes of composite systems: series (cascade) connections

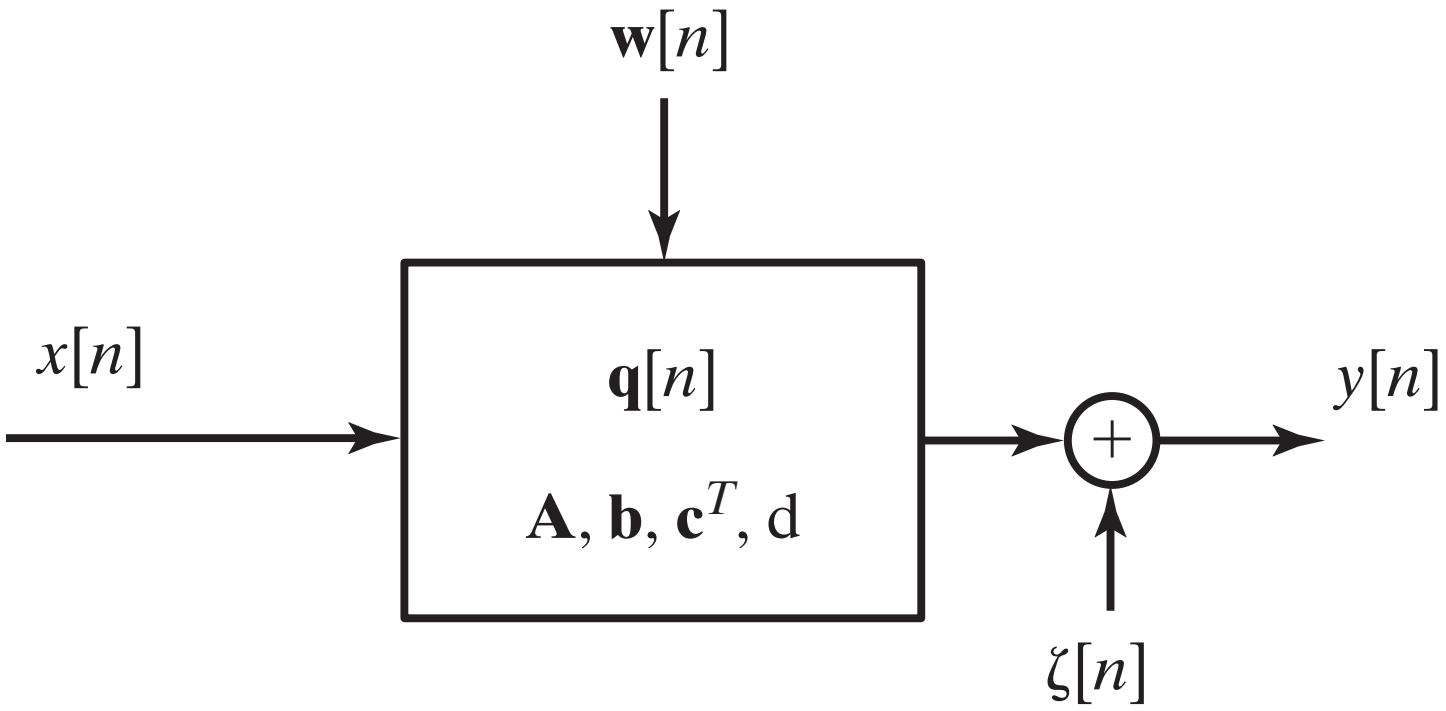


Hidden modes of composite systems: feedback and parallel connections

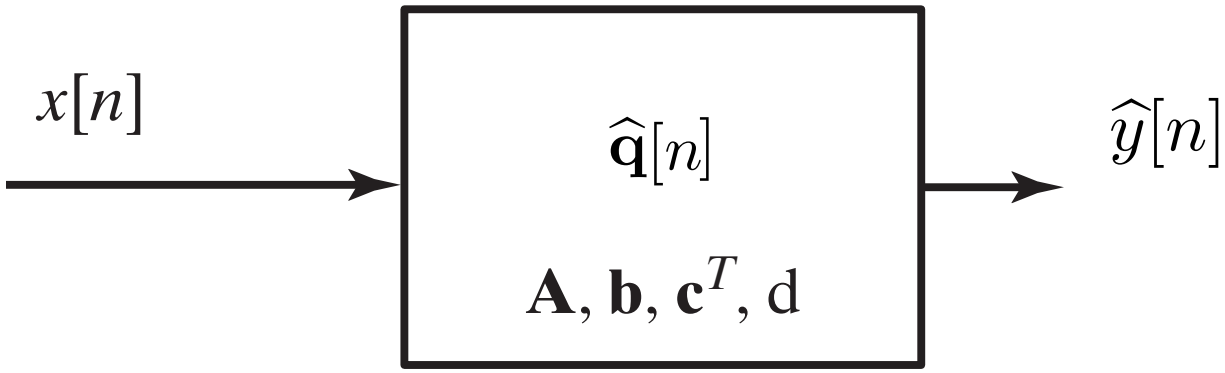


Observers

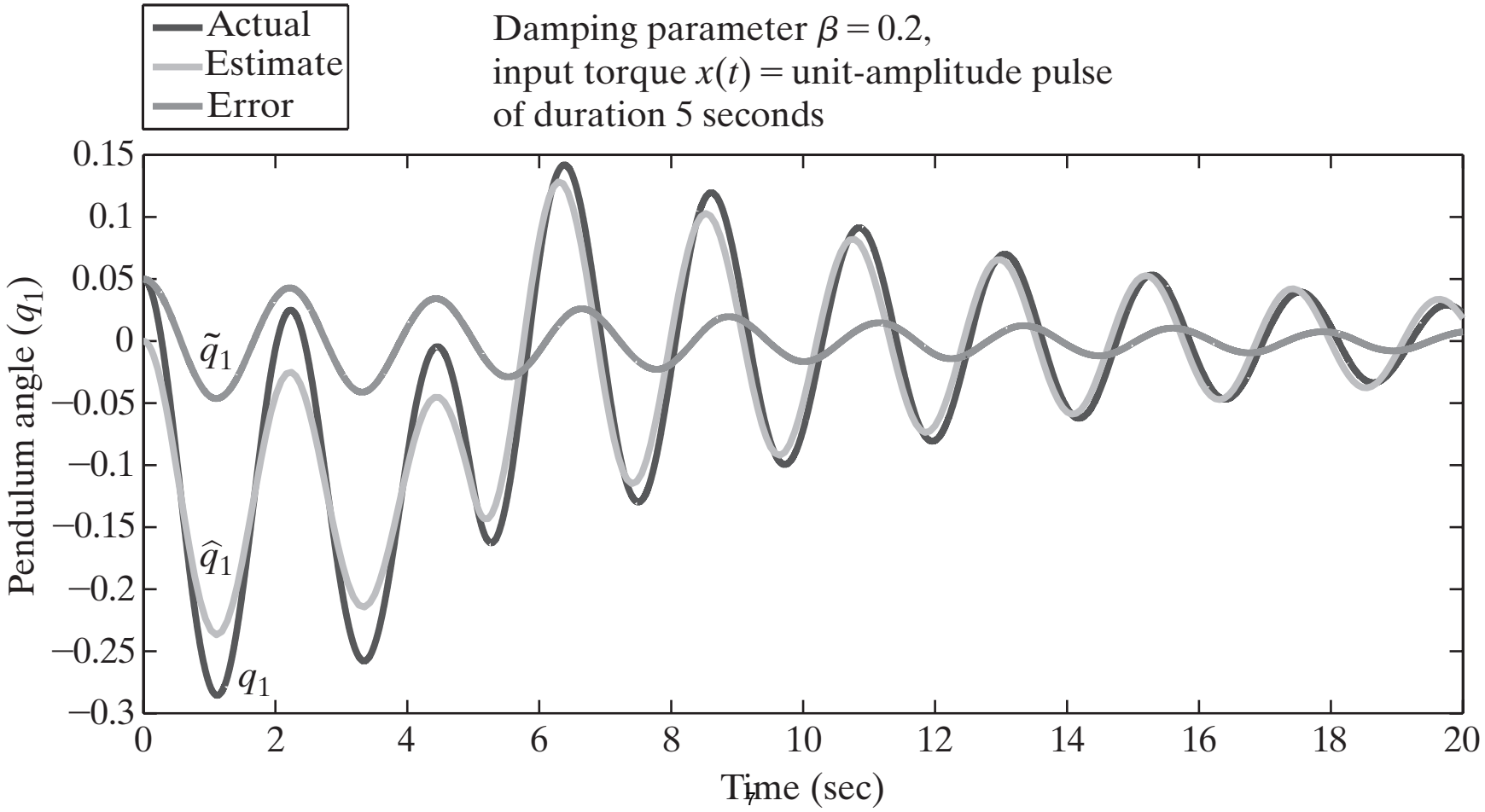
System ("plant")



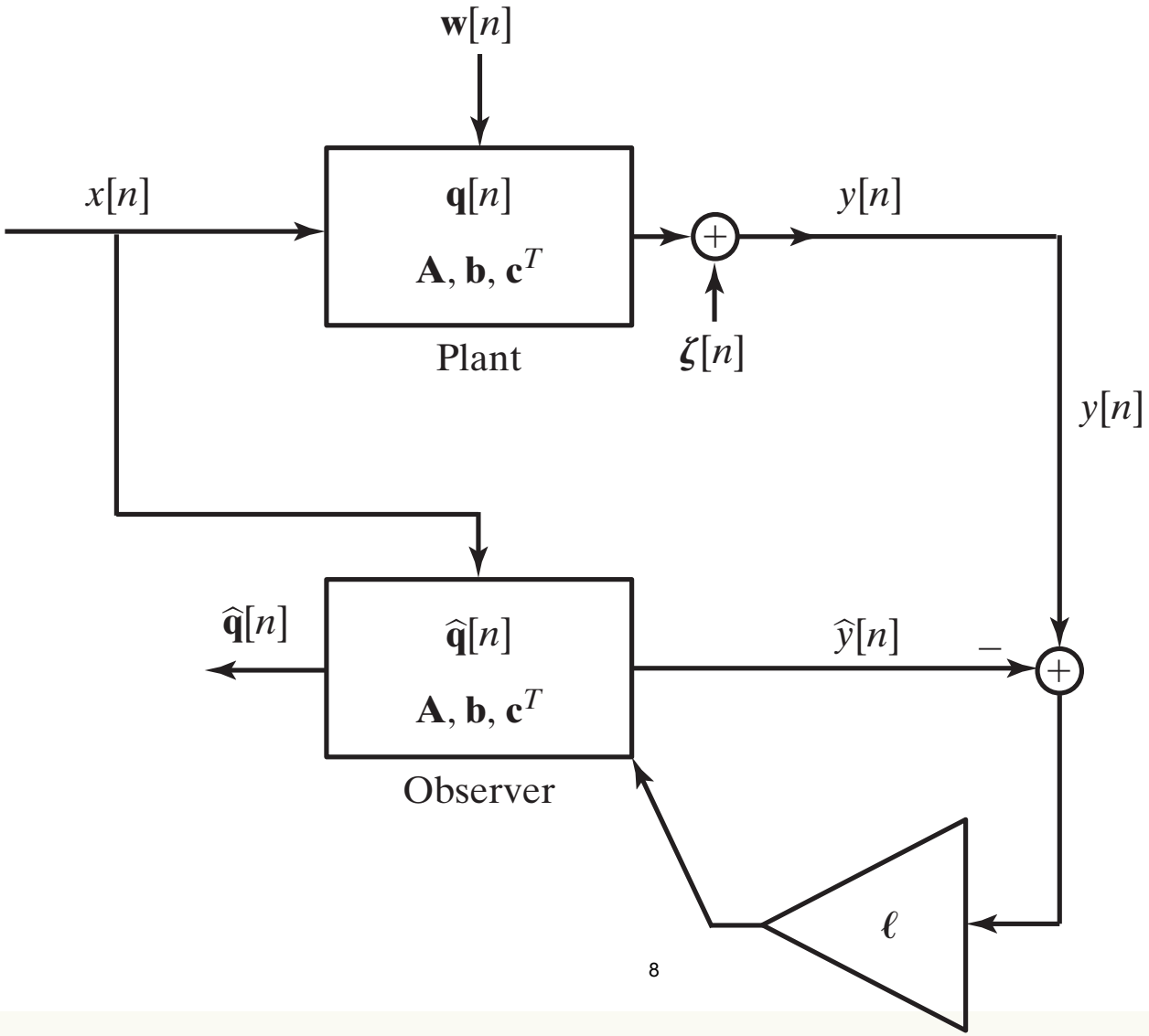
A good model



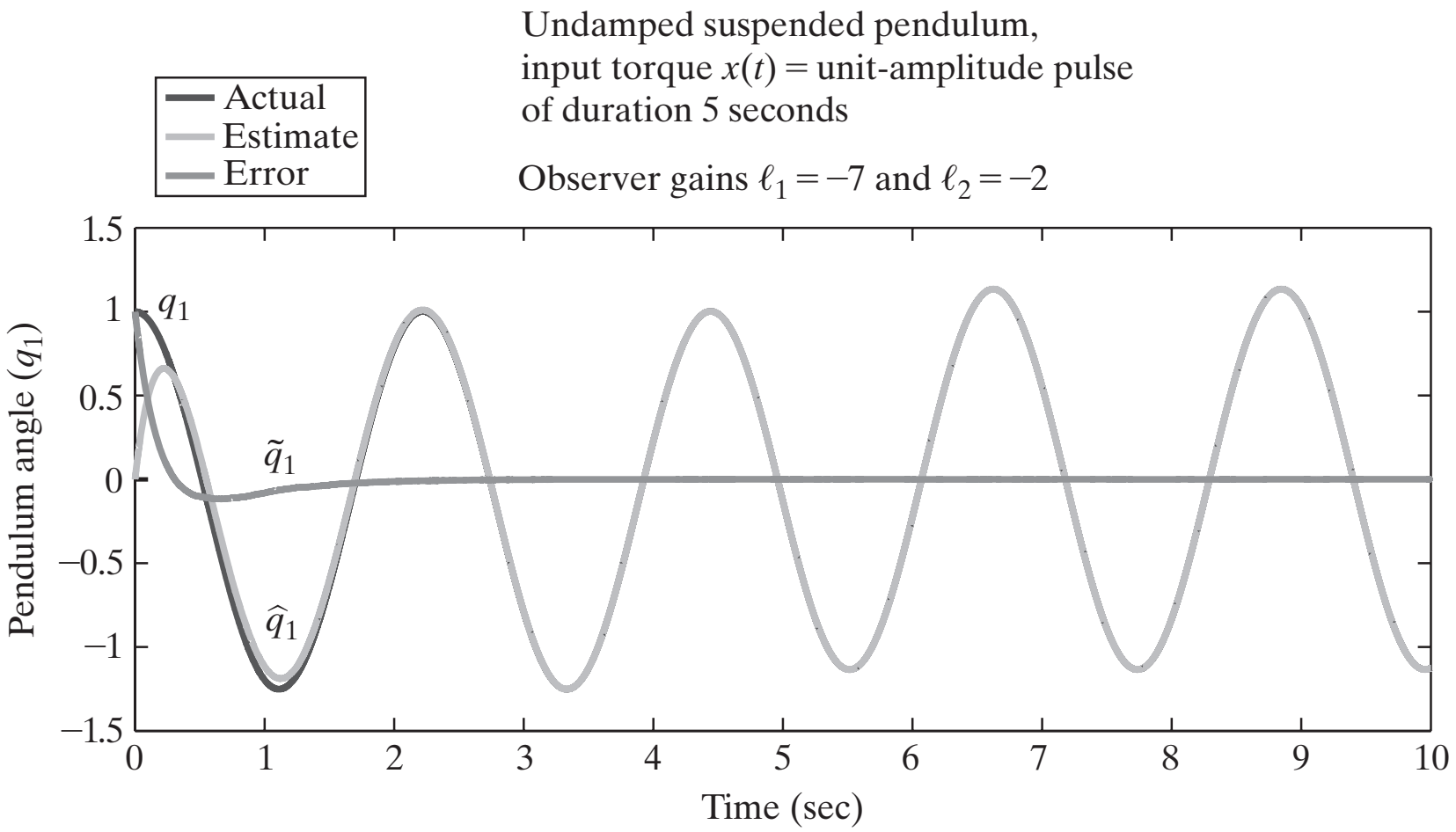
Performance of real-time simulation



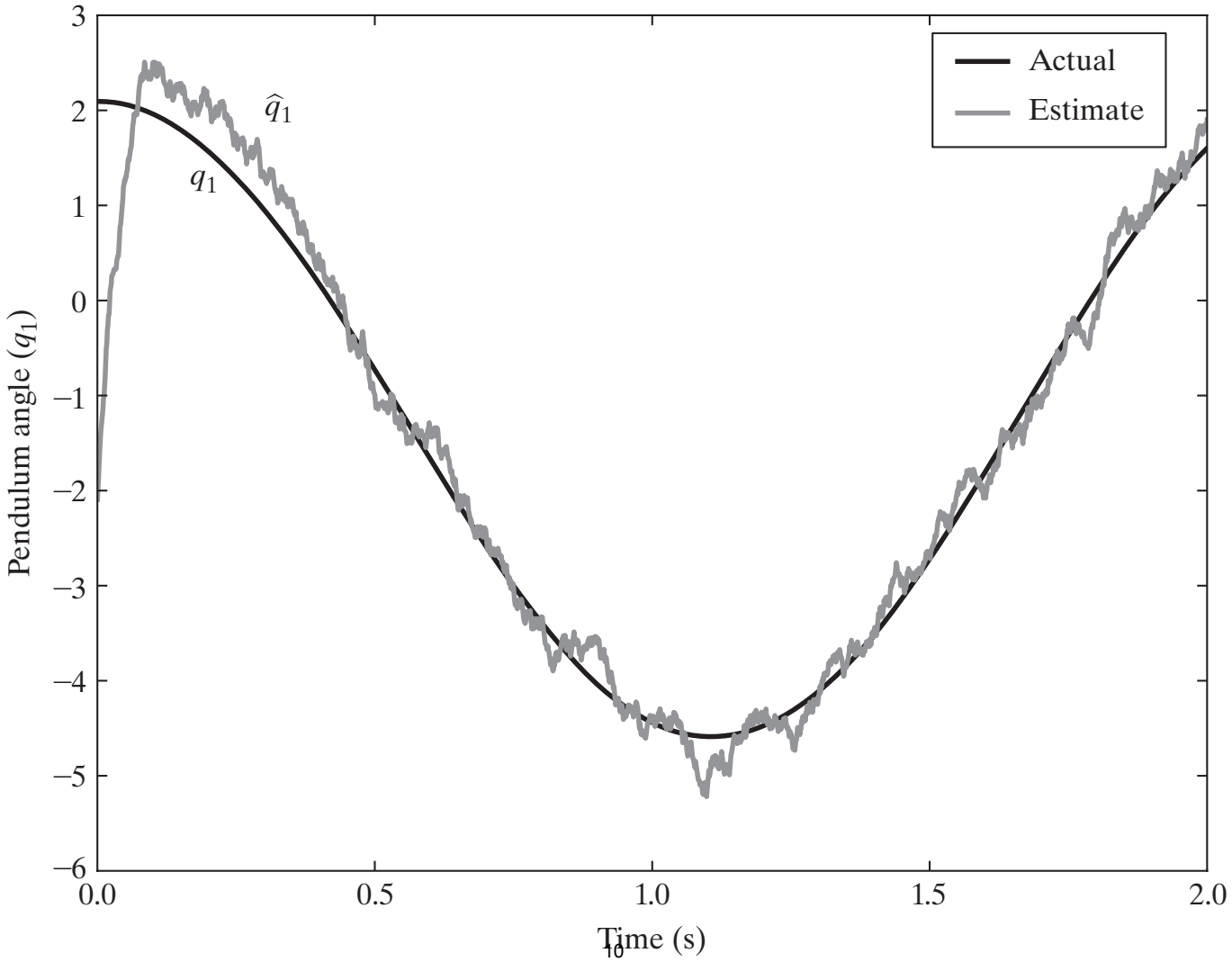
Observer configuration



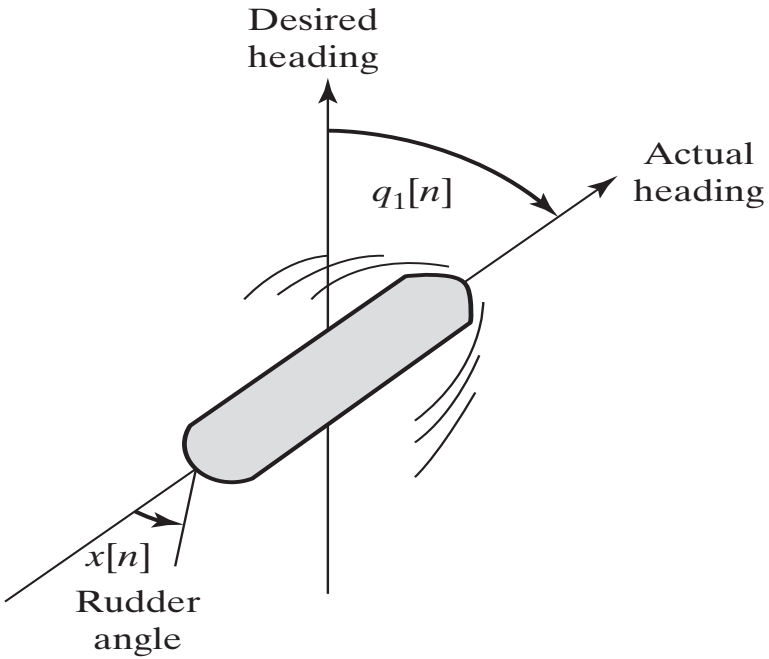
Observer performance (with no measurement noise)



Observer performance (with measurement noise)



Observer for ship heading error



$$\mathbf{q}[n+1] = \begin{bmatrix} q_1[n+1] \\ q_2[n+1] \end{bmatrix} = \begin{bmatrix} 1 & \sigma \\ 0 & \alpha \end{bmatrix} \begin{bmatrix} q_1[n] \\ q_2[n] \end{bmatrix} + \begin{bmatrix} \rho \\ \sigma \end{bmatrix} x[n]$$
$$= \mathbf{A}_1\mathbf{q}[n] + \mathbf{b}x[n] \, .$$

6.011 Signals, Systems and Inference
Spring 2018