

## 9.6 Design Project

The objective of the assignment in this chapter is to estimate the autopilot constants  $b_*$  and to develop a reduced-order Simulink model that can be used to test and debug the guidance algorithm discussed in later chapters, prior to implementation on the full simulation model. We will focus primarily on the models given in equations (9.19) and (9.20).

- 9.1. Create a Simulink S-function that implements the model given in Equation (9.19) and insert it in your MAV simulator. For different inputs  $\chi^c$ ,  $h^c$ , and  $V_a^c$ , compare the output of the two models, and tune the autopilot coefficients  $b_{V_a}$ ,  $b_h$ ,  $b_{\dot{\chi}}$ , and  $b_{\chi}$  to obtain similar behavior. You may need to re-tune the autopilot gains obtained from the previous chapter.
- 9.2. Modify your autopilot function so that it uses the commanded roll angle  $\phi^c$  as an input instead of the commanded course  $\chi^c$ . Create a Simulink S-function that implements the model given in equation (9.20) and insert it in your MAV simulator. For different inputs  $\phi^c$ ,  $h^c$ , and  $V_a^c$ , compare the output of the two models, and tune the autopilot coefficients  $b_*$  to obtain similar behavior. You may need to re-tune the autopilot gains obtained from the previous chapter.