

# Predictive Control with Constraints

## ERRORS DISCOVERED SO FAR

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**Page xiii** ‘Downloadable solution’s manual’ should be ‘Downloadable solutions manual’.

**Page 12** There is an error in equation (1.23) in the book. Since the free response  $\hat{y}_f(k+P_i|k)$  is defined to be the response when the input remains at its last value, namely  $u(k-1)$ , each term in (1.23) involving an input value  $\hat{u}(k+j|k)$  should in fact involve the difference  $\hat{u}(k+j|k) - u(k-1)$ . Thus the correct expression for (1.23) is:

$$\begin{aligned}\hat{y}(k+P_i|k) = & \hat{y}_f(k+P_i|k) + H(P_i)[\hat{u}(k|k) - u(k-1)] + \\ & H(P_i-1)[\hat{u}(k+1|k) - u(k-1)] + \dots \\ & H(P_i-H_u+2)[\hat{u}(k+H_u-2|k) - u(k-1)] + S(P_i-H_u+1)[\hat{u}(k+H_u-1|k) - u(k-1)]\end{aligned}$$

Subsequent expressions are correct.

**Page 47** Last line of Example 2.4: The dimensions given of matrices  $E$  and  $F$  are wrong. They should be  $16 \times 9$  in each case. The dimensions given for the matrix  $G$  are correct.

**Page 70** Exercise 2.3: The formula for the gradient is not (2.19), but the formula for  $\nabla V$  which appears at the end of Mini-Tutorial 1.

**Page 70** Exercise 2.4: The question should refer to Example 2.3, not Example 2.4. (But the reader could answer the question for Example 2.4 too; it is a bit more complicated.)

**Page 72** Exercise 2.12: Not really an error, but the solution to this exercise will probably be clearer after reading sections 3.1 and 3.2 in the next chapter.

**Page 73** Exercise 2.15(b): Actually it is much easier to design the state observer by hand than by using the *Model Predictive Control Toolbox* in this case. But you need to use the *Toolbox* representation of the model in order to perform the simulation in (c) using the *Toolbox*.

**Pages 79 and 81** Figures 3.1 and 3.2: The signal labelled  $\Delta(k)$  should be labelled  $\Delta u(k)$  (as in Figure 3.3).

**Page 105** Exercise 3.4: The reference to equation (2.23) is incorrect. It should be to equation (2.66). (I suppose this should have been a Chapter 2 exercise really.)

**Page 106** Exercise 3.10: The reference to equation (3.4) is spurious. The question should read: ‘Check that the optimization problems (3.88) and (3.90)–(3.91) are standard QP problems.’

**Page 215** Exercise 7.5(c): The parameter value  $H_p = 30$  is too low; this value gives instability. Use  $H_p = 60$  instead.

**Page 226** After ‘**2. Control:**’  $K_{LQ}$  should be  $K_\infty$  (twice) to make it consistent with Figure 8.3.

**Page 319** Table C.1: The *Model Predictive Control Toolbox* parameters **ywt** and **uwt** correspond to  $Q(i)^{1/2}$  and  $R(i)^{1/2}$ , respectively (that is, to  $S_Q$  and  $S_R$  in section 3.1.2).