

3.3.3 Stochastic model with one step information

$$x[k+1] = A x[k] + B u[k] + \epsilon[k]$$

$$y[k+1] = C x[k+1] + \eta[k+1]$$

$$\epsilon[k] \sim N(0, R)$$

$$\eta[k] \sim N(0, Q)$$

Then, Kalman Filter

$$\hat{x}[k+1|k] = A \hat{x}[k|k] + B u[k]$$

$$\Sigma[k+1|k] = A \Sigma[k|k] A^T + R$$

$$K[k+1] = \Sigma[k+1|k] C^T (C \Sigma[k+1|k] C^T + Q)^{-1}$$

$$\hat{x}[k+1|k+1] = \hat{x}[k+1|k] + K[k+1] (y[k+1] - C \hat{x}[k+1|k])$$

$$\Sigma[k+1|k+1] = \Sigma[k+1|k] - K[k+1] C \Sigma[k+1|k]$$