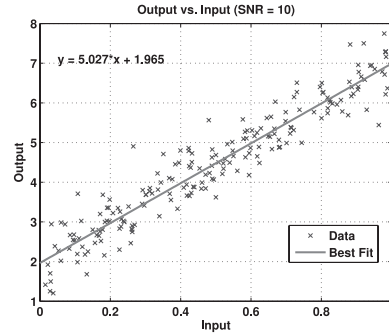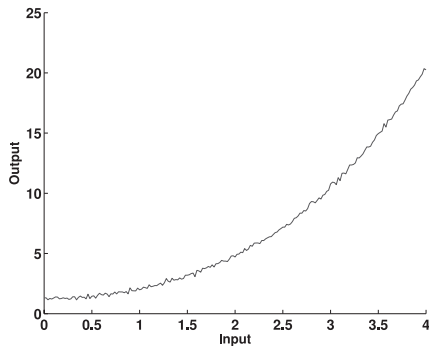(a) $\sigma_{\hat{b}_1} = 0.036$, $\sigma_{\hat{b}_0} = 0.02$ (b) $\sigma_{\hat{b}_1} = 0.114$, $\sigma_{\hat{b}_0} = 0.064$
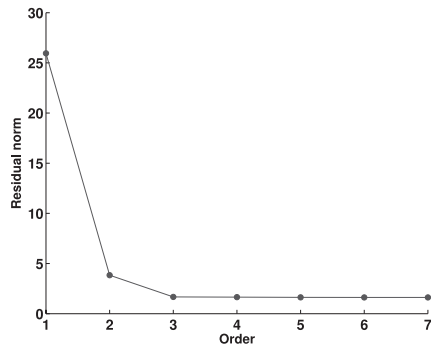
Figure 2.1 The best fit and the error in the parameter estimates depend on the SNR.

(a) Input-output data of Example 2.4   (b) Norm of residuals vs. order of polynomial fit

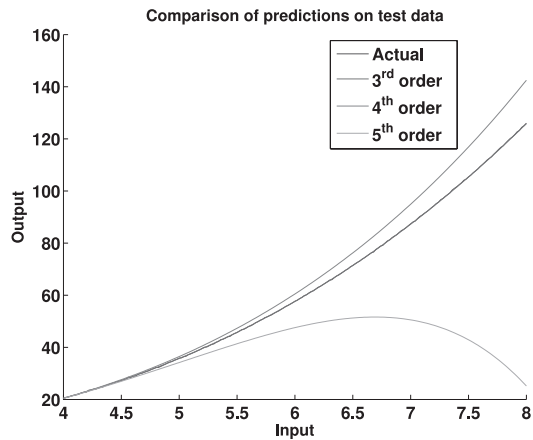Figure 2.2 Training data and order determination in Example 2.4.

002x002.eps

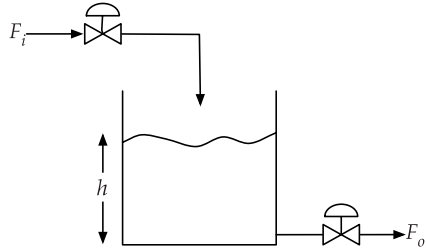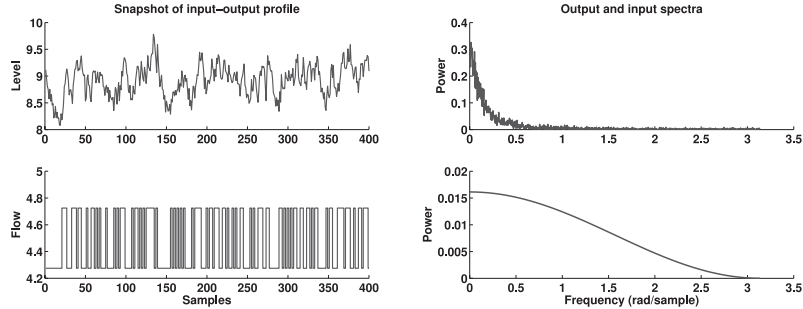Figure 2.3 Cross-validation of polynomial models in Example 2.4

Figure 2.4 Schematic of the liquid level system discussed in Section 2.4.

(a) Snapshot of the flow rate and level data for the liquid level system example

(b) Power spectra of the input and output signals

Figure 2.5 Time-trends and spectra of flow and level measurements in the identification of the liquid level system.
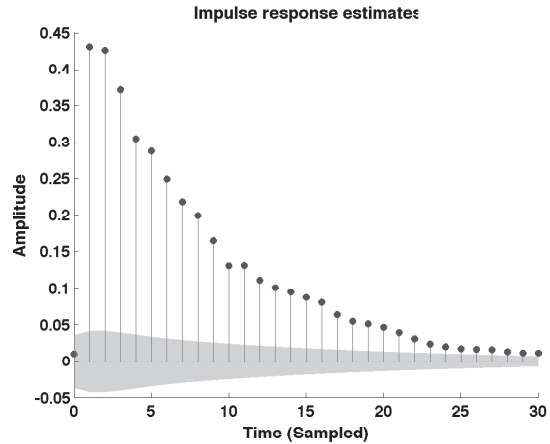
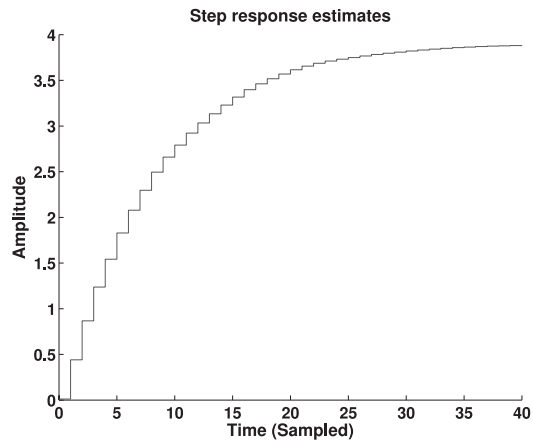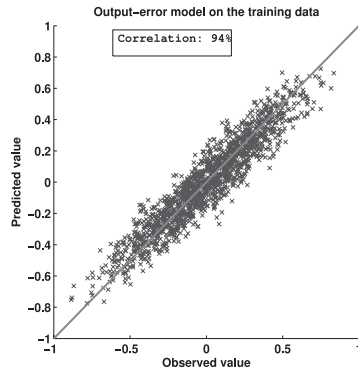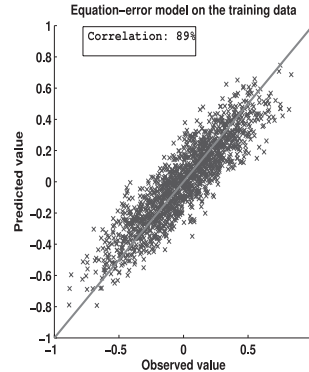Figure 2.6 Impulse response estimates of the liquid level system

Figure 2.7 Step response estimates of the liquid level system

002x007.eps

(a) Output-error model

(b) Equation-error model

Figure 2.8 Comparing one-step ahead predictions (deviations from steady-state) of the identified models on the training data.
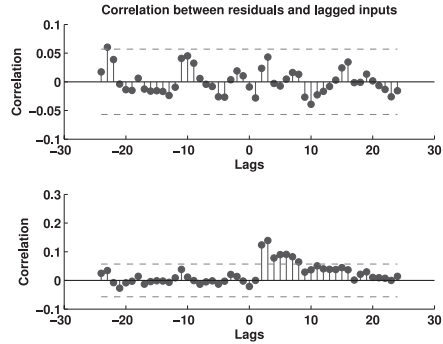
Figure 2.9 Correlation between residuals and lagged inputs for the output-error (bottom) and equation-error (top) models.
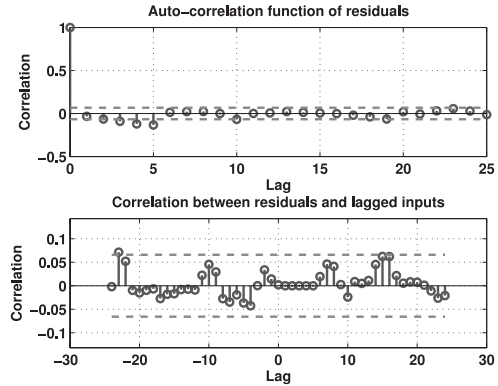
Figure 2.10 Correlation analysis of residuals obtained from the best equation-error model
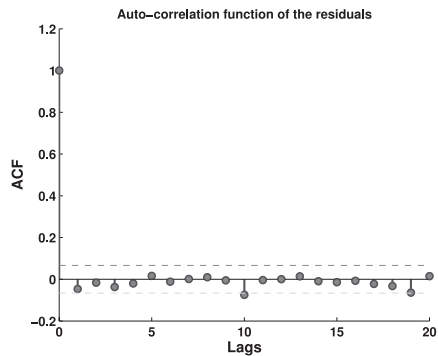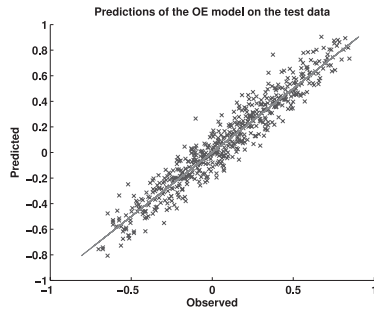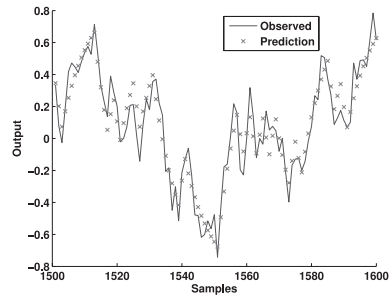
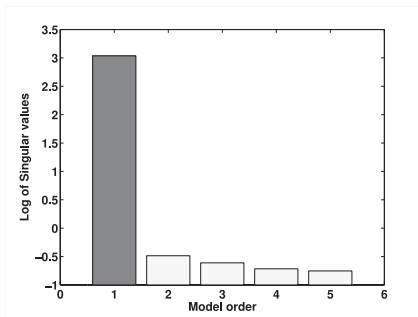Figure 2.11 Auto-correlation function of the residuals from the output-error model.
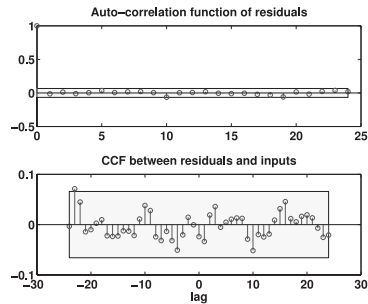
(a) Scatter plot

(b) Snapshot of predictions

Figure 2.12 Infinite-step ahead predictions from the output-error model on the test data set

002x012.eps

(a) log Hankel singular values   (b) Residual analysis of the first-order model

Figure 2.13 Plot of (log) Hankel singular values and correlation functions from the state-space model.