ID6

ARMAX Identification

6.16 EXAMPLE 6.5

Using (6.15.4) we will now compute the covariance of the PEM estimate performed in Example 6.4. The value of σ_ε^2 corresponding to this model is $\sigma_\varepsilon^2 = J_{500}^{ML}(\theta) = 0.0377$; the covariance matrix (6.15.4) is, at the tenth iteration of the Gauss–Newton algorithm,

$$\operatorname{cov}\theta_{500}^{\circ} = 10^{-3}\begin{bmatrix} 0.126 & -0.213 & 0.039 & 0.063 & -0.212 & 0.208 \\ -0.213 & 1.031 & -0.993 & 0.155 & 0.904 & -1.064 \\ 0.039 & -0.993 & 1.349 & -0.395 & -0.806 & 1.039 \\ 0.063 & 0.155 & -0.395 & 0.190 & 0.091 & -0.163 \\ -0.212 & 0.904 & -0.806 & 0.091 & 2.608 & -2.476 \\ 0.208 & -1.064 & 1.039 & -0.163 & -2.476 & 2.906 \end{bmatrix}.$$

The standard deviations of the model parameters are

$$\begin{array}{lll} \operatorname{std}\alpha_1 = 0.011\ (0.0044) & \operatorname{std}\beta_1 = 0.037\ (0.0365) & \operatorname{std}\gamma_1 = 0.051\ (0.0163) \\ \operatorname{std}\alpha_2 = 0.032\ (0.0305) & \operatorname{std}\beta_2 = 0.014\ (0.0108) & \operatorname{std}\gamma_2 = 0.054\ (0.0272); \end{array}$$

it can be noted that actual deviations (reported in parentheses) show a good agreement with expected values and also that the standard deviations of the PEM estimates are lower than those of the IV estimates obtained in Example 6.2.

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