ID6

ARMAX Identification

6.6 MODEL ORDER ESTIMATION

The determination of a suitable order (or range of orders) for an ARMAX model can be performed applying the criteria that have already been described (PPCRE, FPE, AIC, MDL, whiteness test on residuals) to a sequence of models with increasing orders. Differently from the ARX case, it is here necessary to perform an estimate of all model parameters in order to compute its prevision and $J(\theta)$ before applying the criteria. Denoting with $\sigma_\varepsilon(k)$ the standard deviation of the residuals of an ARMAX model with order k, the PPCRE criterion is given by

$$PPCRE(k) = 100\,\frac{\sigma_\varepsilon(k)}{\sigma_y}. \qquad (6.6.1)$$

FPE, AIC and MDL criteria are given by expressions (3.14.17), (3.14.20) and (3.14.22) that can be immediately computed from $J(\theta)$. A whiteness test on the residuals, using (3.14.24), is, in any case, recommended either to determine the order (applying it to models with increasing orders) or to validate the model. Also the test on the correlation between the residuals and inputs can give useful indications on the suitability of the model in describing the process.

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