

ID6

ARMAX

Identification



6.9 EXTENDED IV METHODS



IV methods can be extended in several ways; among them, methods that introduce matrices of instruments with a number of columns, n_z , larger than the number, $2n$, of parameters to be estimated and methods performing a pre-filtering of the input-output sequences. The parameter vector is estimated, in these cases, minimizing the expression

$$\|Z^T y^{\circ*} - Z^T H^* \theta\|_2 \quad (6.9.1)$$

where

$$H^* = [h_{ij}^*(t)] \quad (i = 1, \dots, N) \quad (j = 1, \dots, 2n) \quad (6.9.2)$$

$$h_{ij}^*(t) = \Pi(z) h_{ij}(t) \quad (6.9.3)$$

$$y^{\circ*} = [y_i^{\circ*}(t)] \quad (i = 1, \dots, N) \quad (6.9.4)$$

$$y_i^{\circ*}(t) = \Pi(z) y_i^{\circ}(t); \quad (6.9.5)$$

$h_{ij}(t)$ denotes the entries of H , $y_i^{\circ}(t)$ those of y° and $\Pi(z)$ the transfer function of the filter adopted. The estimate is given by

$$\theta^{\circ} = (H^{*T} Z Z^T H^*)^{-1} H^{*T} Z Z^T y^{\circ*} \quad (6.9.6)$$

and the corresponding covariance matrix is

$$\text{cov } \theta^{\circ} = \sigma_w^2 E \left[(H^T Z Z^T H)^{-1} H^T Z Z^{*T} Z^* Z^T H (H^T Z Z^T H)^{-1} \right] \quad (6.9.7)$$

where

$$z_{ij}^*(t) = \Pi(z) r(z) z_{ij}(t). \quad (6.9.8)$$

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