

ID4

AR Identification



4.9 MULTIVARIABLE AR MODELS AND PREDICTORS

Multivariable AR models can be deduced in an obvious way from ARX ones; relations (3.17.2) and (3.17.6) become

$$y_i(t + v_i) = \sum_{j=1}^m \sum_{k=1}^{v_{ij}} \alpha_{ijk} y_j(t + k - 1) + e_i(t + v_i) \quad (4.9.1)$$

$$Q(z)^* y(t) = D(z)^* e(t) \quad (4.9.2)$$

where $Q(z)^*$ and $D(z)^*$ are given by (3.17.7a) and (3.17.7c). Forward and backward models (3.17.8) and (3.17.10) become

$$y(t + v_M) = Q_{v_M+1}^{*-1} \left[\sum_{i=1}^{v_M} Q_i^* y(t + i - 1) \right] + e^*(t + v_M) \quad (4.9.3)$$

$$y(t) = Q_{v_M+1}^{*-1} \left[\sum_{i=1}^{v_M} Q_{v_M+1-i}^* y(t - i) \right] + e^*(t). \quad (4.9.4)$$

while the expression of predictor (3.17.11) is

$$y(t|t-1) = Q_{v_M+1}^{*-1} \left[\sum_{i=1}^{v_M} Q_{v_M+1-i}^* y(t-i) \right]. \quad (4.9.5)$$

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