EXAMPLE/2

ARMAX

$$y(t) + a_1 y(t-1) + \dots + a_{n_a} y(t-n_a)$$
$$= b_1 u(t-1) + \dots + b_{n_b} u(t-n_b)$$
$$+ e(t) + c_1 e(t-1) + \dots + c_{n_c} e(t-n_c)$$

$$A(q)\, y(t) = B(q)\, u(t) + C(q)\, e(t)$$

$$G(q) = \frac{B(q)}{A(q)} \qquad H(q) = \frac{C(q)}{A(q)}$$

$$\hat{y}(t|\theta) = \frac{B(q)}{C(q)} u(t) + \left[1 - \frac{A(q)}{C(q)}\right] y(t)$$

$$C(q)\, \hat{y}(t|\theta) = B(q)\, u(t) + \left[C(q) - A(q)\right] y(t)$$

START UP AT t: INIT KNOWLEDGE $\quad \hat{y}(0|\theta) \dots \hat{y}(-n_c+1|\theta)$
$\quad y(0) \dots y(-n^*+1)$
$\quad u(0) \dots u(-n_b+1)$

START UP AT $\text{MAX}(n^*, n_b)$

$$n^* = \text{MAX}(n_c, n_a)$$

PREDICTION ERROR: $\varepsilon(t|\theta) = y(t) - \hat{y}(t|\theta)$

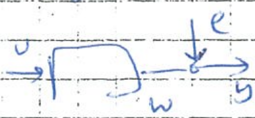
$$\underline{\varphi}(t, \theta) = [-y(t-1) \dots -y(t-n_a) \;\; u(t-1) \dots u(t-n_b) \dots$$
$$\dots \varepsilon(t-1, \theta) \dots \varepsilon(t-n_c, \theta)]^T$$

$$\hat{y}(t|\theta) = \underline{\varphi}^T(t, \underline{\theta}) \cdot \underline{\theta}$$

PSEUDO LINEAR REGRESSION

LOCAL MINIMUM, INIT, ETC.

EXAMPLE/3 OUTPUT ERROR MODEL STRUCTURE **(OE)**



$$y(t) = w(t) + e(t)$$

$$w(t) + f_1 w(t-1) + \dots + f_{n_f} w(t-n_f) = b_1 u(t-1) + \dots + b_{n_b} u(t-n_b)$$

$$y(t) = \frac{B(q)}{F(q)} u(t) + e(t) \qquad \hat{y}(t|\theta) = \frac{B(q)}{F(q)} u(t)$$