$$\underline{\theta} = [b_1 \cdots b_{n_b}\ f_1 \cdots f_{n_f}]^T$$

$$\underline{\varphi}(t,\theta) = [u(t-1) \cdots u(t-n_b)\ -w(t-1,\theta) \cdots -w(t-n_f,\theta)]^T$$

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

PSEUDO LINEAR REGRESSION

(—//—)

EXAMPLE 4

## FIR / ORTONORMAL BASIS MODELS

$$G(q,\theta) = \sum_1^\infty b_k q^{-k}$$ < LINEAR REGRESSION + OE MODEL

$$\theta = [b_1 \cdots b_n]^T$$

$$\underline{\varphi}(t) = [u(t-1) \cdots u(t-n)]$$

$q^{-1}$ EXPRESSION $1, q^{-1}, q^{-2}, \ldots, q^{-k}$

$$G(q,\theta) = \sum_1^n \theta_k L_k(q,\alpha)$$ USER DEFINED

E.g. $L_k(q,\alpha) = \dfrac{q^{-k}}{q-\alpha}$ POLE CLOSE TO UNIT

E.g. ORTOGONAL LAGUERRE POLYNOMIALS: $L_k(q,\alpha) = \dfrac{1}{q-\alpha}\left(\dfrac{1-\alpha q}{q-\alpha}\right)^{k-1}$

## PARAMETRIC MODELS OF TF

1. RATIONAL FUNCTIONS

$$G(\Lambda,\theta) = \frac{B(\Lambda,\theta)}{A(\Lambda,\theta)} = \frac{\sum_0^{n_b} b_k \Lambda^k}{\sum_0^{n_a} a_k \Lambda^k}$$

$$\underline{\theta} = [a_0\ a_1 \cdots a_{n_a}\ b_0\ b_1 \cdots b_{n_b}]$$

$\Lambda$ — $s$ (p) differ

$z^{-n}$ (q) shift

- EASY INITIALIZATION
- $n_a, n_b > 30$ LARGE ORDERS NUMERICALLY UNSTABLE (LS NORMAL EQUATION)