

CANONICAL STRUCTURES # PARAMETERS IN G (FOR A GIVEN MODEL)
 \ll # OF PARAMETER PLACES IN A, B, C, D

SPECIAL STRUCTURES

- SS MODEL DOES NOT EXIST FOR IMPROPER SYSTEMS $n_b > n_a$
- DOES NOT ALLOW TO CHOOSE n_b (NUMERATOR OF G)
- EASY EXTENSION TO MIMO SYSTEMS

EG: $A(\theta)$ $B(\theta)$ $C(\theta)$

$$A(\theta) = \begin{bmatrix} x & & \\ & \underline{I_{n-1}} & \\ & & x-0 \end{bmatrix} \quad B(\theta) = \begin{bmatrix} x \\ \\ x \end{bmatrix} \quad K(\theta) = \begin{bmatrix} x \\ 1 \\ x \end{bmatrix}$$

$$C(\theta) = [1 \ 0 \ \dots \ 0]$$

$$x(t+1, \theta) = A(\theta)x(t, \theta) + B(\theta)u(t) + K(\theta)e(t)$$

$$y(t) = C(\theta)x(t, \theta) + e(t)$$

3n PARAMETERS : $2 \times (n-1)$ TH ORDER NUM
 n TH ORDER COMMON DEN

INPUT-OUTPUT RELATION, DFT SPECTRA & SIGNALS

PERIODIC SIGNALS

$u(t)$ - HARMONICS $n f_0$, $T_0 = 1/f_0$

STEADY-STATE RESPONSE IF: $N T_s = M T_0$

$$Y(k) = G(\omega_k, \theta) U(k) \quad \text{AT HARMONIC FREQUENCIES}$$

ARBITRARY SIGNALS - TRANSIENTS, SPECTRUM LEAKAGE

EXTENDED TF MODEL:

$$A(\omega_k, \theta) Y(k) = B(\omega_k, \theta) U(k) + I(\omega_k, \theta) + \Delta(\omega_k)$$

TRANSIENT LEAKAGE \nearrow RESIDUAL ALIASING \nwarrow