Q. STAT. $\Phi_s(\omega) = |G(e^{j\omega})|^2 \, \Phi_w(\omega)$

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$\Phi_{sw}(\omega) = G(e^{j\omega}) \, \Phi_w(\omega)$

$$\left[\, y(t) = G(q)\, u(t) + H(q)\, e(t) \,\right]$$

$u(t)$: Q. STAT. DET, $\Phi_u(\omega)$

$e(t)$: WHITE NOISE, VARIANCE λ, INDEPENDENT OF $u(t)$

Q. STAT.

$$\left[\begin{aligned} \Phi_y(\omega) &= |G(e^{j\omega})|^2 \Phi_u(\omega) + \lambda |H(e^{j\omega})|^2 \\ \Phi_{yu}(\omega) &= G(e^{j\omega}) \, \Phi_u(\omega) \end{aligned}\right.$$

SPECTRAL FACTORIZATION

$\Phi_v(\omega)$ - REAL, AND IF $\Phi_v(\omega) > \phi$

RATIONAL FUNCTION OF $\cos\omega$ ($e^{j\omega}$)

THEN THERE EXIST A MONIC RATIONAL FUNCTION OF z, $R(z)$

$R(z) = a_n + \dots + z^n$ — NO POLES, NO ZEROS ON/OUTSIDE UNIT CIRCLE

THAT: $\Phi_v(\omega) = \lambda \, |R(e^{j\omega})|^2$

IF STOCH. PROCESS $v(t)$ HAS <u>RATIONAL SPECTRUM</u>,

IT CAN BE REPRESENTED AS $v(t) = R(q)\, e(t)$

RATIONAL: $R(q) = \dfrac{C(q)}{A(q)}$

$C(q) = 1 + c_1 q^{-1} + \dots + c_{n_c} q^{-n_c}$

$A(q) = 1 + a_1 q^{-1} + \dots + a_{n_a} q^{-n_a}$

$v(t) + a_1 v(t-1) + \dots + a_{n_a} v(t-n_a) = e(t) + c_1 e(t-1) + \dots$

$$\left[\, v(t) = -a_1 v(t-1) - \dots + e(t) + \dots \,\right]$$

ARMA PROCESS MODELL (AR, MA)

(TO PARAMETRIC IDENTIFICATION OF TF)