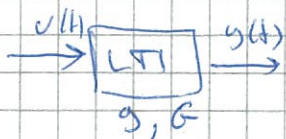


EMPIRICAL TRANSFER FUNCTION ESTIMATE (ETFE)

(52)



$$y(t) = G(q) u(t)$$

$$= g(t) * u(t)$$

$$\downarrow \quad \quad \downarrow \quad \quad \downarrow \quad \quad \text{FOURIER-TRANSFORM (IDEAL)}$$

$$Y(\omega) = G(\omega) U(\omega)$$

FINITE RECORD:

$$\{u(t), y(t)\}_{t=1}^N \rightarrow \left\{ \cancel{Re\{G\}} U_N(\omega), Y_N(\omega) \right\}_{\omega = \frac{2\pi k}{N}}^{N/2-1}$$

$$G(\omega) = \frac{Y(\omega)}{U(\omega)} \rightarrow \left[\text{ETFE } \hat{G}_N(e^{j\omega}) = \frac{Y_N(\omega)}{U_N(\omega)} \right]$$

$$U_N(\omega) \neq 0 \text{ AT GRID } \omega = \frac{2\pi k}{N}$$

IF $u(t), y(t)$ REAL

$$\hat{G}_N(e^{j\frac{2\pi k}{N}}) = \overline{\hat{G}_N(e^{j\frac{2\pi(N-k)}{N}})} \quad k=0, 1, \dots, N-1$$

PROPERTIES OF ETFE

$$Y_N(\omega) = G_0(e^{j\omega}) U_N(\omega) + R_N(\omega) + V_N(\omega)$$

$\begin{matrix} \text{L TRANSIENTS} \\ \text{L NOISE} \end{matrix}$

$$\hat{G}_N(e^{j\omega}) = \frac{Y_N(\omega)}{U_N(\omega)} = G_0(e^{j\omega}) + \frac{R_N(\omega)}{U_N(\omega)} + \frac{V_N(\omega)}{U_N(\omega)} \neq G_0(e^{j\omega}) (!)$$

$$y(t) = G_0(q) u(t) + v(t)$$

\downarrow STABLE \downarrow $|u| \leq C$ \downarrow STATIONARY STOCH PROCESS

$$\phi_u(\omega)$$

$$R_v(\tau)$$

$$\sum_{-\infty}^{\infty} |\tau R_v(\tau)| < \infty$$