VARIANCE

$$\hat{G}(j\omega_k) = G_0(j\omega_k)\,\frac{1+N_1(k)}{1+N_2(k)}$$

EXPECTATION TO NOISE

RANDOM INPUT FIXED

$$\cong G_0(j\omega_k)\left(1 + N_1(k) - N_2(k)\right)$$

$$N_1 = N_Y / Y_0$$

$$N_2 = N_U / U_0$$

$$\sigma_G^2(k) \simeq |G_0(j\omega_k)|^2 \left[\frac{\sigma_Y^2(k)}{\sum |Y_0^{(l)}(k)|^2} + \frac{\sigma_U^2(k)}{\sum |U_0^{(l)}(k)|^2} - 2\,\mathrm{Re}\,\frac{\sigma_{YU}^2(k)}{\sum Y_0^{(l)} \overline{U}_0^{(l)}} \right]$$

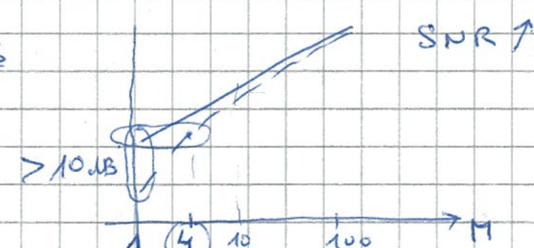
$$M \cdot \frac{1}{M} \quad \& \quad M \to \infty$$

$$\simeq \frac{|G_0(j\omega_k)|^2}{M} \left(\frac{\sigma_Y^2(k)}{\Phi_{Y_0}(\omega_k)} + \frac{\sigma_U^2(k)}{\Phi_{U_0}(\omega_k)} - 2\,\mathrm{Re}\,\frac{\sigma_{YU}^2(k)}{\Phi_{Y_0U_0}(\omega_k)} \right)$$

FOR SMALL M: $\hat{\Phi}_{U_0}^{(M)}(\omega_k) = \frac{1}{M} \sum |U_0^{(l)}(k)|^2 \neq \Phi_{U_0}(\omega_k)$

VARIABLE

LOSS DUE TO RANDOMNESS



LEAKAGE ERRORS

$$G_0(j\omega_k) \neq \frac{Y_0(k)}{U_0(k)}$$

TRANSIENTS

IF $y(t) = G(q)\,u(t)$ STABLE SYSTEM (LJUNG)

$u(t)$ UNIFORMLY BOUNDED, FILTERED WHITE NOISE

THEN $Y(k) = G(j\omega_k)\,U(k) + R_N(k)$

DFT

$O\left(\frac{1}{\sqrt{N}}\right)$ UNIFORMLY IN FREQUENCY