

FIR (ETFE) MEASUREMENTS WITH RANDOM EXCITATIONS



SIGNAL CHANGES IN BLOCKS!

$$G^{(k)} = \frac{y^{(k)}}{u^{(k)}}$$

- INFINITE VARIANCE (DIRECT)

REDUCE NOISE BEFORE DIVISION?

- BIAS ERRORS (NL BEHAVIOR OF DIVISION)

$$E\{u^{(k)}(n)\} = \phi$$

CIRCULAR GAUSSIAN: RANDOM PHASE



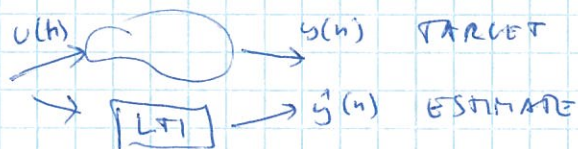
PHASE ELIMINATION: $u^{(k)}(n), \overline{u^{(k)}(n)}$

$$\hat{G}(\omega) = \frac{\sum u^{(k)}(n) \overline{u^{(k)}(n)}}{\sum |u^{(k)}(n)|^2}$$

- DISCRETE WIENER-HOPF EQUATION

$$\begin{aligned} & \text{LS ESTIMATE OF } G \\ & \Phi_{yu}(\omega) = G(\omega) \Phi_u(\omega) \end{aligned}$$

MINIMAL MSE, LS, WIENER-FILTERING PROBLEM



$$\hat{y}(n) = G(\gamma) u(n) \sim y(n)$$

$$e(n) = \hat{y}(n) - y(n)$$

$$\min_{\gamma(n)} V = E\{e^2(n)\} \quad \begin{aligned} & \text{FIR} \\ & \text{NON-CAUSAL} \\ & \text{CAUSAL FILTER} \end{aligned}$$

NONCAUSAL DISCRETE TIME WIENER FILTER $y(n) = ?$

$$\frac{\partial}{\partial \gamma(n)} E\left\{\left(\sum_{k=-\infty}^{\infty} \gamma(k) u(n-k) - y(n)\right)^2\right\} = \phi$$