$$\mathrm{Var}\{G(j\omega_k)\} = \sigma_G^2(k) = E\{|N_G(j\omega_k)|^2\}$$

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

↖ SNR ↗

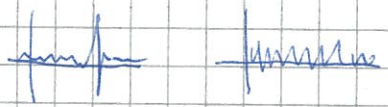
↑

- APPROXIMATION !
  - THEORETICAL VARIANCE $= \infty$, NOM $\simeq \phi$, OUTLIERS
    (E.G. ELIMINATING OUTLIERS)

- VARIANCE $\sigma_G^2(k) \downarrow$ — FREQUENCY BY FREQUENCY
  MORE POWER $|U_0(k)|$, $|Y_0(k)|$ IN BAND
  |
  WHAT IF NONLINEAR FOR HIGH PEAK VALUE ?

## CR OPTIMIZATION

CREST FACTOR: $CR = \dfrac{U_{PEAK}}{U_{RMS}} = \dfrac{\max |u(t)|}{\sqrt{\frac{1}{N}\sum u^2(t)}} = \text{MIN}$ !



PURE SINE $CR = \sqrt{2} \simeq 1.4$

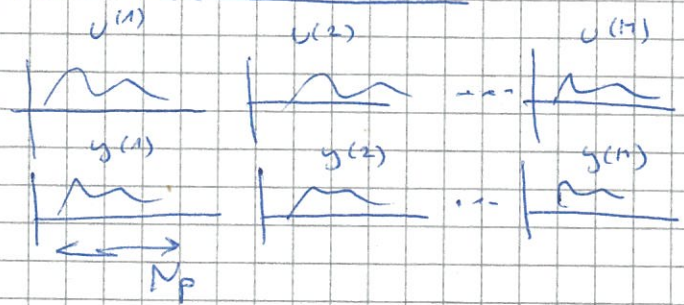
MIN (OPT) SCALING VALUE $CR = 1$

} $L^{2k}$ $\|\cdot\|_{2k}^2$ OPTIMIZATION

## REDUCING VARIANCE FOR PERIODIC EXCITATIONS

MULTIPLE DATA BLOCKS

$u_0(t)$, $y_0(t)$ THE SAME
NOISES INDEPENDENT BETWEEN BLOCKS




$u_0(nT_s) = u_0((n+N_p)T_s)$ (TIME-DOMAIN)