ECE 615 - Lecture 26

Note Title 4/14/2016

$N \times 4$ $\quad$ $\mathbf{K}$ $\quad$ $\ell[n]$

$$\begin{bmatrix} \ell_0 & \ell_1 & \ell_2 & \ell_3 \end{bmatrix} \begin{bmatrix} k_0 \\ k_1 \\ k_2 \\ k_3 \end{bmatrix} = \begin{bmatrix} \ell(0) \\ \ell(1) \\ \ell(2) \\ \vdots \\ \ell(N-1) \end{bmatrix}$$

$\mathbf{K}$

$$\ell_0 = \begin{Bmatrix} \ell_0[0] \\ \ell_0[1] \\ \ell_0(2) \\ \vdots \end{Bmatrix}$$

N samples

$$A\,\mathbf{k} = \ell$$

$$\underset{N\times 4}{A}\,\underset{4\times 1}{k} = \underset{N\times 1}{l}$$

$$\cancel{k = A^{-1} l}$$

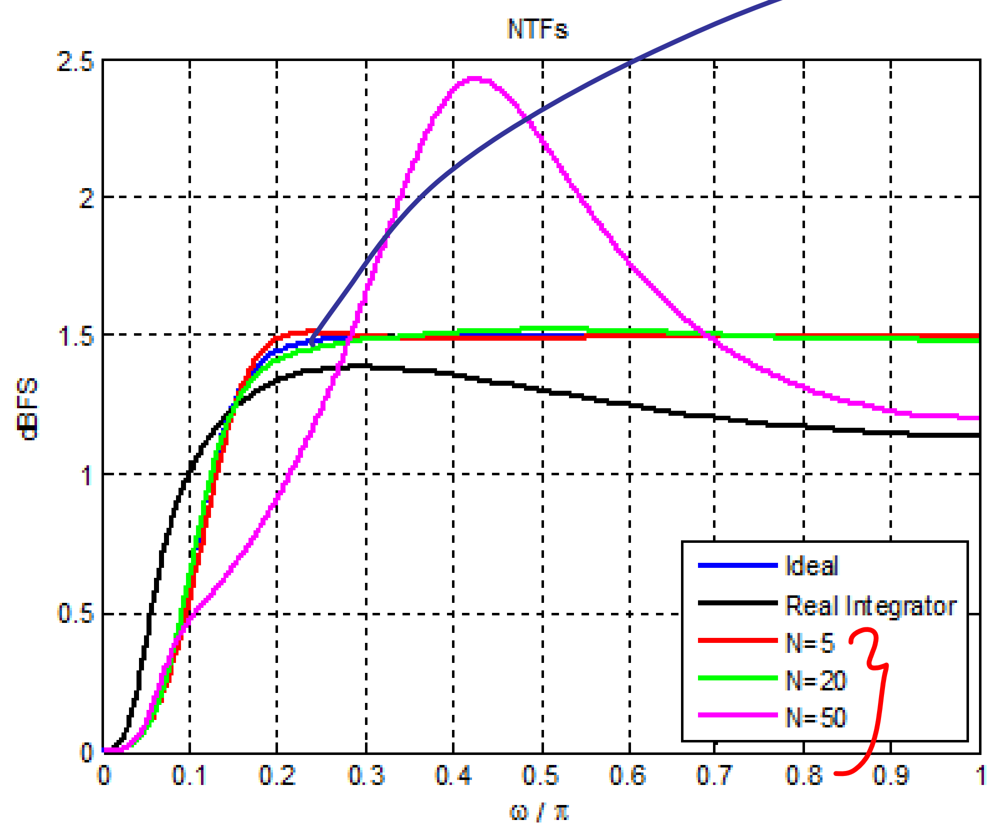
$$(A^T A) k = A^T l$$

$$\cancel{(A^T A)^{-1}} \cancel{(A^T A)} k = (A^T A)^{-1} A^T l$$

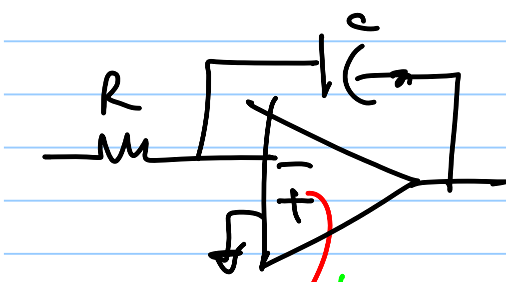
$$k^* = \underbrace{(A^T A)^{-1} A^T}_{\text{pseudo-inverse of } A} l$$

least mean square error

IDEAL NTF



$\cancel{\frac{1}{s}}$



$\frac{1}{sRC}$

$$A_0 \frac{\left(1+\frac{s}{\omega_z}\right)}{\left(1+\frac{s}{\omega_{p1}}\right)\left(1+\frac{s}{\omega_{p2}}\right)}$$

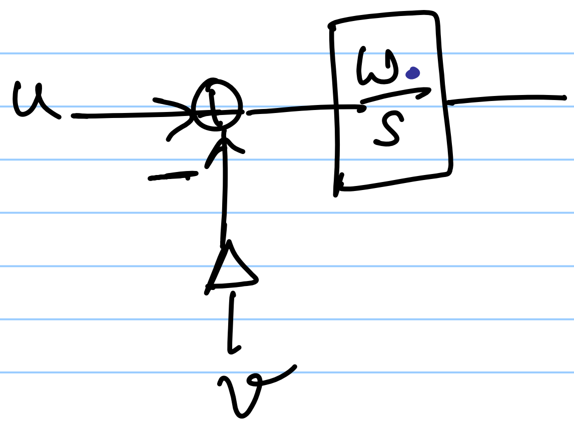
find K $\qquad$ $\underline{\underline{l_c[n] = l[n]}}$

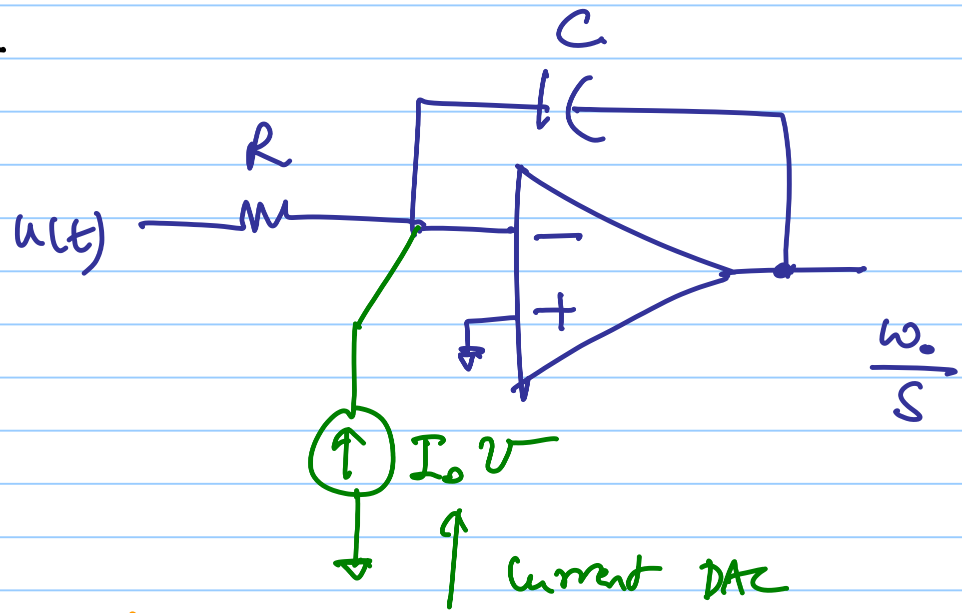
$L(z) + e(z) \Rightarrow \quad NTF(z) = \frac{1}{1+L(z)}$

what if we fitted

$$NTF(z)\left(1 + L(z)\right) = 1$$

$$h[n] \circledast \left[\delta[n] + l[n]\right] = \delta[n]$$





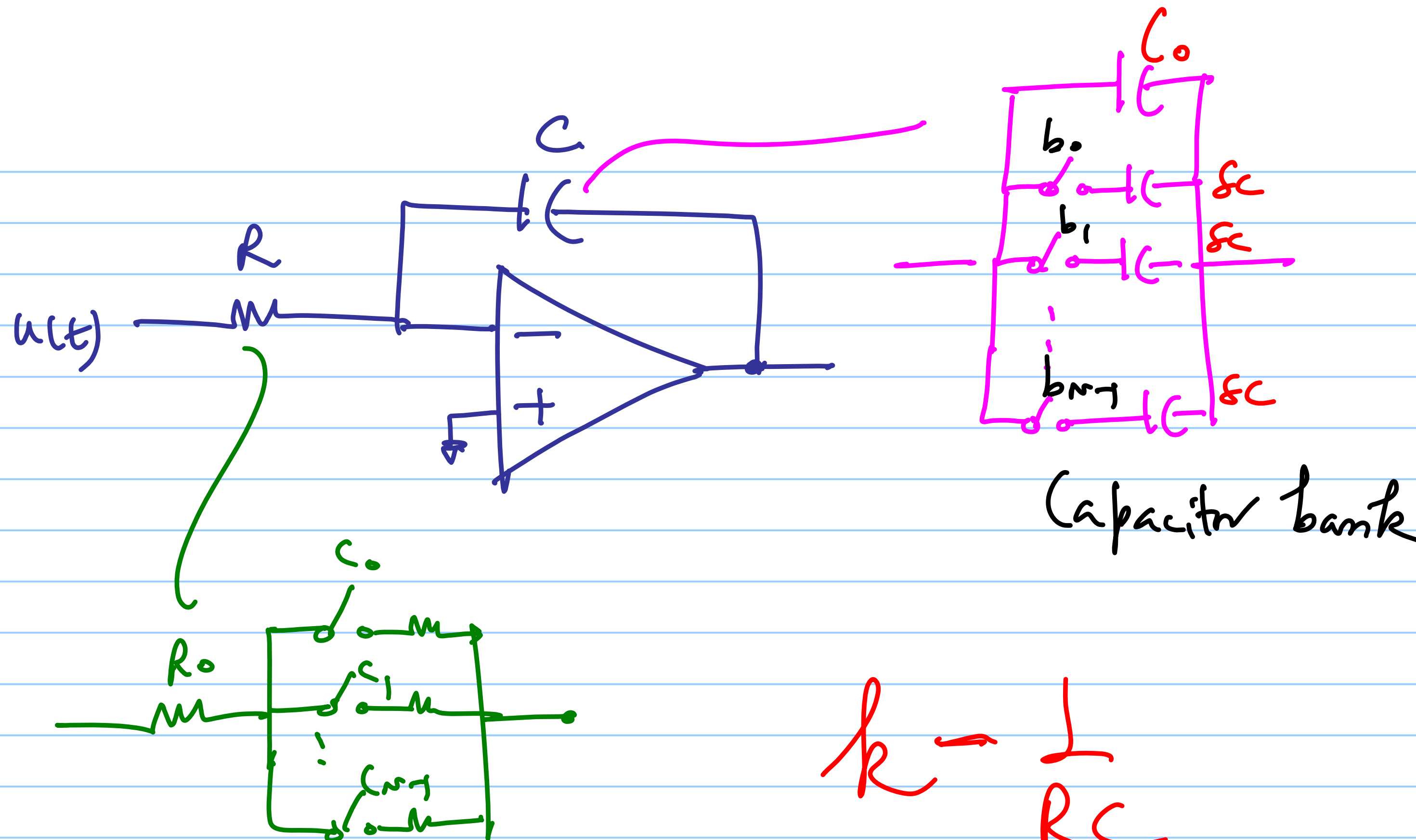
$\omega_o = \frac{1}{RC}$

R, C

±20%

$\tau = RC$ ±40% variation

R's are varying by ±40%



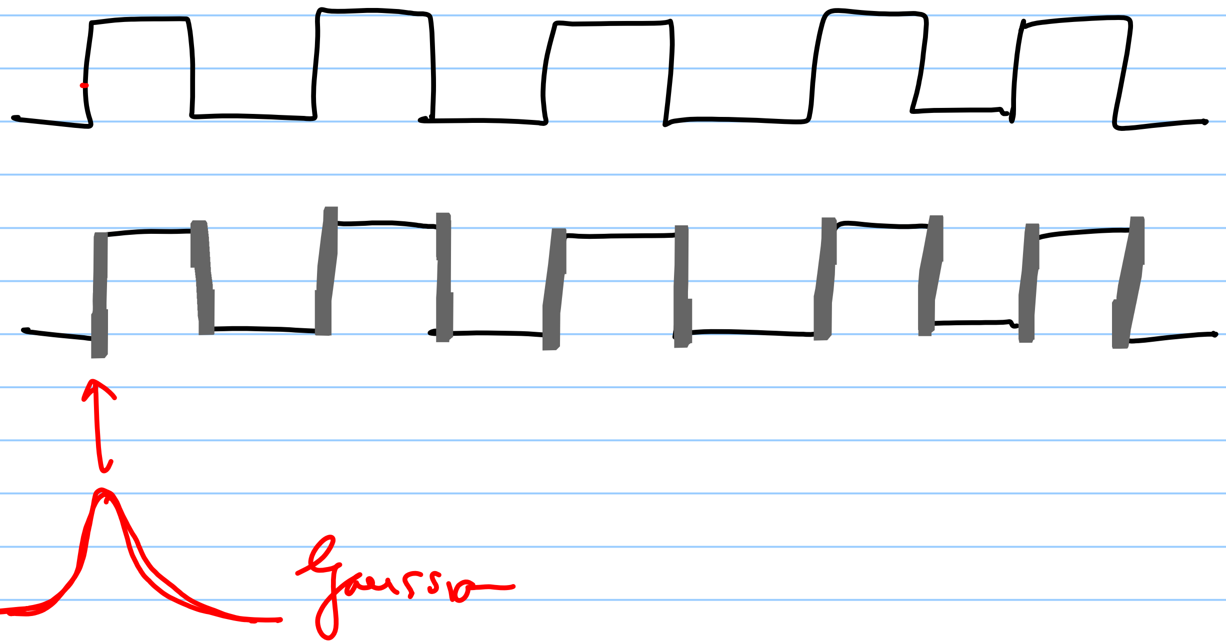
$$k = \frac{1}{RC}$$

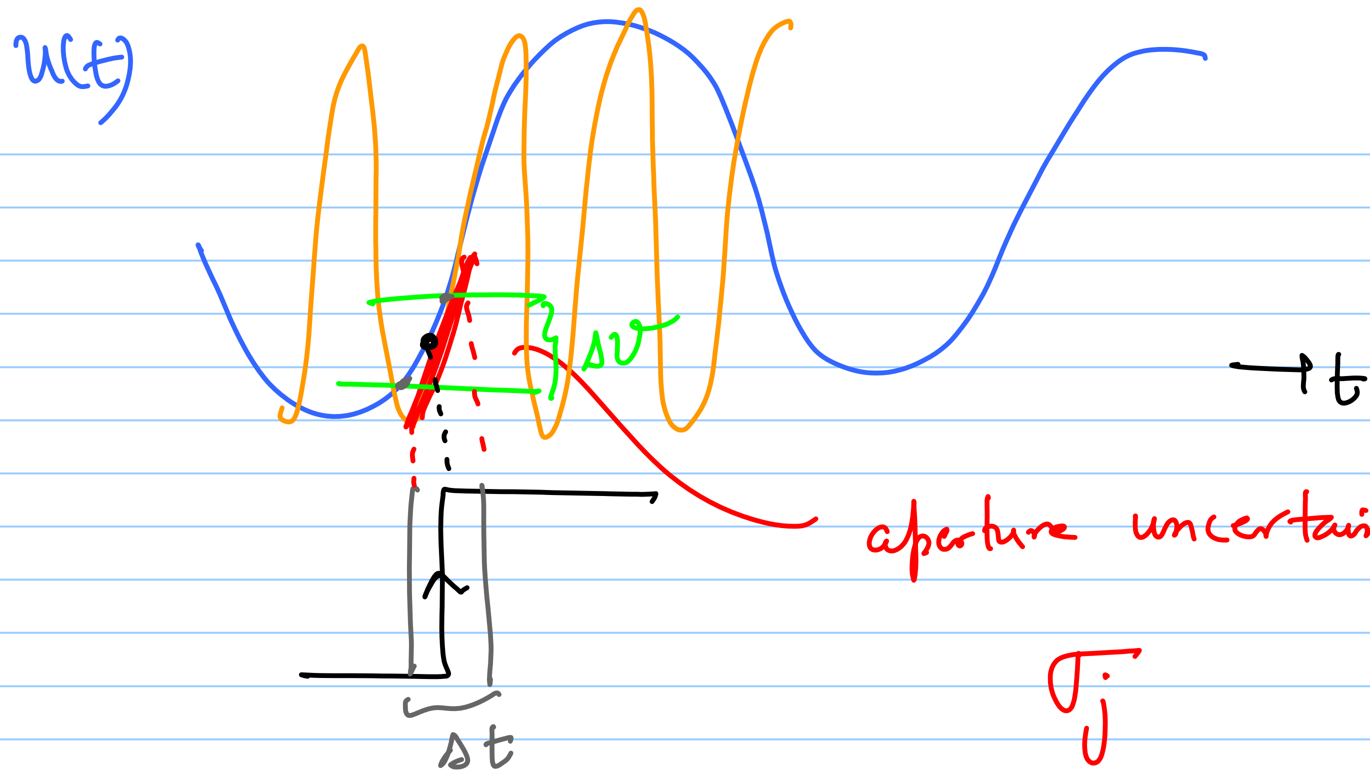
$v[n]$

$w[n] = v[n] - v[n-1]$

amount of wiggling

$\tilde{\sigma}_{w[n]} \rightarrow$ use this to trim RC banks



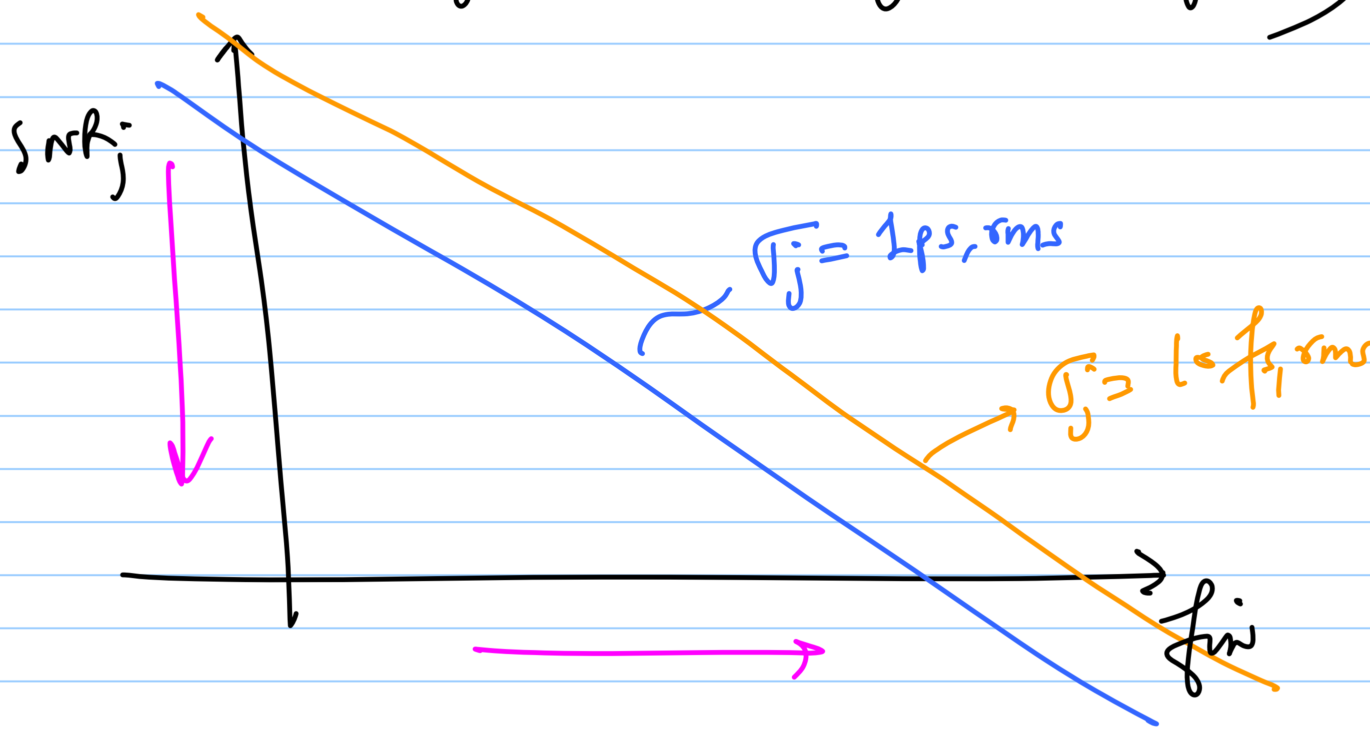


aperture uncertainity

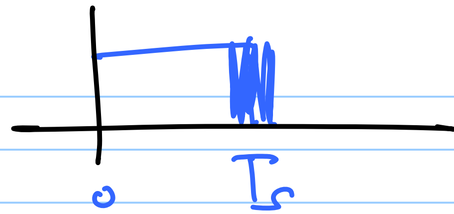
σ_j

$$\frac{dV_{in}}{dt} \Rightarrow \omega_{in}$$

$$SNR_j = -20\log_{10}\left(2\pi f_{in}\,\sigma_j\right)$$



CT DAC



DT DAC