→ SPNS - 4/21/2015 - ELEC3004 -

WINDOWING

$$y[n] = h[n] \cdot x[n]$$

$h[n]$: LPF / HPF / ETC.

$x[n]$: SIGNAL

$w[n]$: WINDOW FUNCTION

↳ finite duration TBA

↳ $w[n] = \{1 \text{ for } a < n < b,\ 0 \quad n > b\}$

$$\Rightarrow \quad x_w[n] = x[n] \cdot w[n]$$

$$h_w[n] = h[n] \cdot w[n]$$

where $w[n] = 0$ for $n < 0,\ n \geq N$

∴ we define the window for a sequence of length N

TWO CASES

[1] SPECTRAL ANALYSIS

[2] FIR FILTER DESIGN.

[1] SPECTRAL ANALYSIS $\Leftrightarrow$ X

↳ GOAL: process a finite length of data

DTFT $\quad X_w(e^{j\Omega}) = \frac{1}{2\pi} X(e^{j\Omega}) \circledast W(e^{j\Omega})$

$$X_w(e^{j\Omega}) = \frac{1}{2\pi} X(e^{j\Omega}) \circledast W(e^{j\Omega})$$

(3) • peak side level ⟹ DYNAMIC RANGE

• Mainlobe ⟹ Resolution of the spectral estimator

(4) FIR FILTERS ⟺ H_w

$$h_w[n] = h[n] \cdot w[n]$$