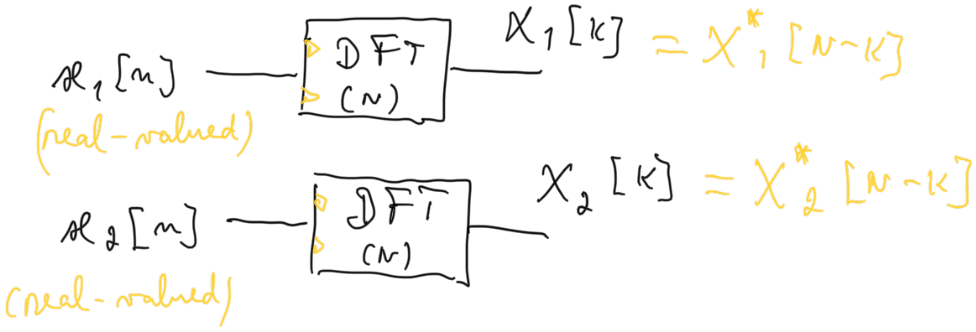
PDSI29APR2021

Lecture # 20 :)

$$x_1[n] \longleftrightarrow X_1[k] = X_1^*[(-k)_N] = X_1^*[N-k]$$

(real-valued)

$k = 1, 2, \ldots, \frac{N}{2}$



$$y[n] = x_1[n] + j\,x_2[n]$$

$$Y[k] = X_1[k] + j\,X_2[k]$$

$$Y[N-k] = X_1[N-k] + j\,X_2[N-k]$$

$$Y^*[N-k] = \underbrace{X_1^*[N-k]}_{= X_1[k]} - j\,\underbrace{X_2^*[N-k]}_{= X_2[k]}$$

$$Y^*[N-k] = X_1[k] - j\,X_2[k]$$

$$X_1[K] = \frac{Y[K] + Y^*[N-K]}{2}$$

$$= \frac{Y_{RE}[K] + Y_{RE}[N-K]}{2} + j\,\frac{Y_{IM}[K] - Y_{IM}[N-K]}{2}$$

even part of real component

odd part of imaginary component

$$X_2[K] = \frac{Y[K] - Y^*[N-K]}{2j}$$

$$= \frac{Y_{IM}[K] + Y_{IM}[N-K]}{2} - j\,\frac{Y_{RE}[K] - Y_{RE}[N-K]}{2}$$

even part of imaginary component

odd part of real component

$\boxed{Y[K]}$

RE →	EVEN	ODD
IM →	EVEN	ODD