Tema 2b)

$$X_N(\omega) = \sum_{n=-N}^{n} x[n]\, e^{-j\omega n}$$

$$x[n] = \cos(\omega_0 n + \varphi)$$

$$\Rightarrow X_N(\omega) = \sum_{n=0}^{N-1} \cos(\omega_0 n + \varphi)\, e^{-j\omega n}$$

·) Folosind formula $\cos\alpha = \dfrac{e^{j\alpha} \cdot e^{-j\alpha}}{}$ avem:

$$X_N(\omega) = \sum_{n=0}^{N-1} \frac{e^{j(\omega_0 n + \varphi)} + e^{-j(\omega_0 n + \varphi)} \cdot 2}{2}\, e^{-j\omega n}$$

$$= \frac{1}{2} \sum_{n=0}^{N-1} \left(e^{j(\omega_0 n + \varphi - \omega n)} + e^{-j(\omega_0 n + \varphi + \omega n)} \right)$$

$$= \frac{1}{2} \underbrace{\sum_{n=0}^{N-1} e^{j(\omega_0 n + \varphi - \omega n)} + \sum_{n=0}^{N-1} e^{-j(\omega_0 n + \varphi + \omega n)}}_{}$$

$$\Downarrow$$

Rezultatul obținut explică
de ce graficul spectrului este
simetric pt ω_0 și $-\omega_0$.

-1-