questionfft-mathcad11,rev2.mcd

Try these values for z1: 5.00 500

5.3285 502.885

5.2165 503

round(z1 − 10)

$z1 := 500$

$f\_offset1 := round(z1 - 10)$

$f\_offset2 := round(z1 + \delta 1 - 35)$ keeps both spectral sections within graph plot.

bin center

$freqz(z1) = 469.19$

$pwrZ(z1) = 0.5$ $pwrz(z1) = 0.5$

**freq in terms of bin #**

$$freqz(z) := \frac{N0 \cdot \delta k \cdot z}{\pi}$$

$$pwrZ(z) := \left| \begin{array}{l} \text{"power in frew spectrum"} \\ Z \leftarrow i(z) \\ \left(|Z_0|\right)^2 + 2 \cdot \sum_{k=1}^{last(Z)} \left(|Z_k|\right)^2 \end{array} \right.$$

$$pwrz(z) := \left| \begin{array}{l} \text{"power in time sequence"} \\ vz \leftarrow I(z) \\ \frac{1}{rows(vz)} \cdot \sum_{k=0}^{last(vz)} \left(|vz_k|\right)^2 \end{array} \right.$$

Number of cycles over full sampling interval ( $N0 \cdot \Delta k$ repeat interval).
spectral "leakage occurs when this is not an integer.

$z1 = 500$

$\delta 1 = 228.16$

$(z1 + \delta 1) = 728.16$

$$\frac{10 \cdot \Delta k \cdot z1}{\pi} = 469.19$$ for z1 component

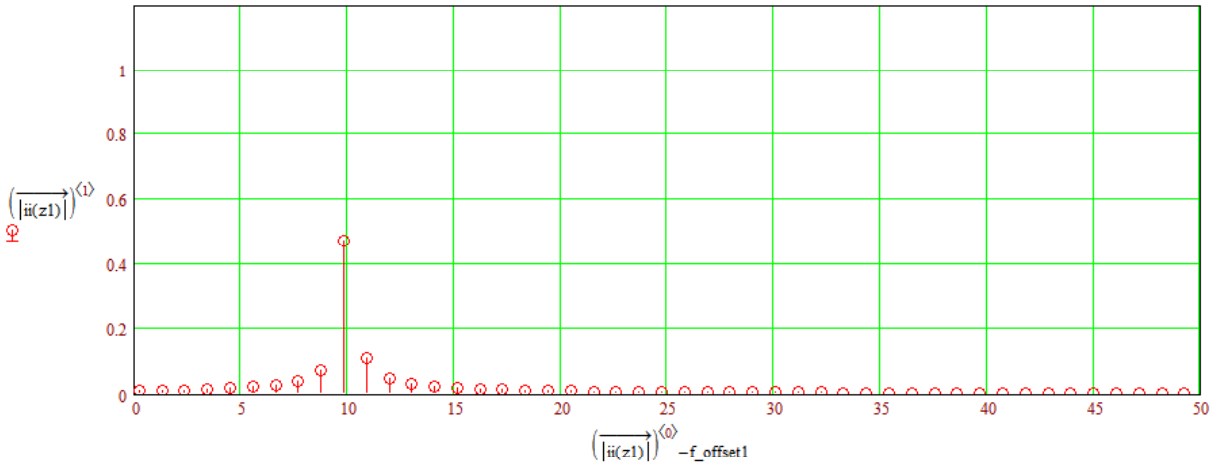
$$\frac{10 \cdot \Delta k \cdot (z1 + \delta 1)}{\pi} = 683.29$$ for $z1 + \delta 1$ component

Number of samples per cycle (want >2 to prevent aliasing)

$$\frac{N0 \cdot \pi}{10 \cdot \Delta k \cdot z0}$$ samples per cycle

$$\frac{N0 \cdot \pi}{10 \cdot \Delta k \cdot z1} = 8.73$$ for z1 component

$$\frac{N0 \cdot \pi}{10 \cdot \Delta k \cdot (z1 + \delta 1)} = 5.99$$ for $z1 + \delta 1$ component




**z1 spectrum (expanded)**

$z1 = 500$