

WINDOWS AND WINDOWING

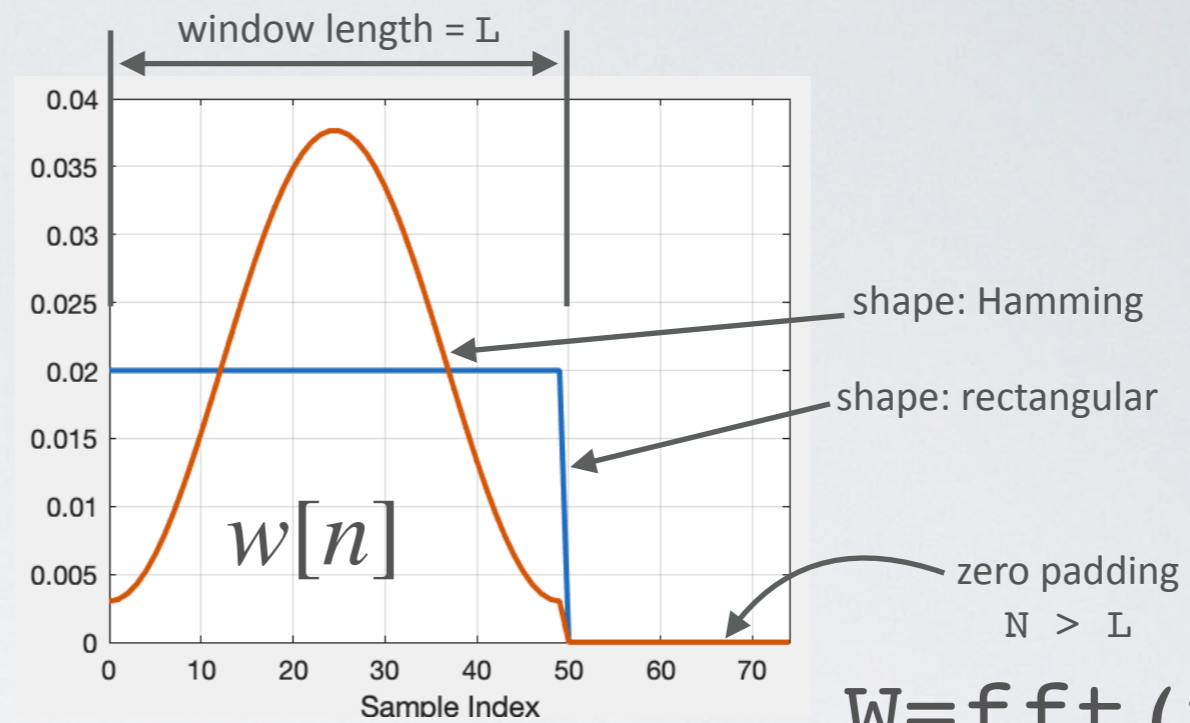


DTFT

WINDOWING PROPERTY

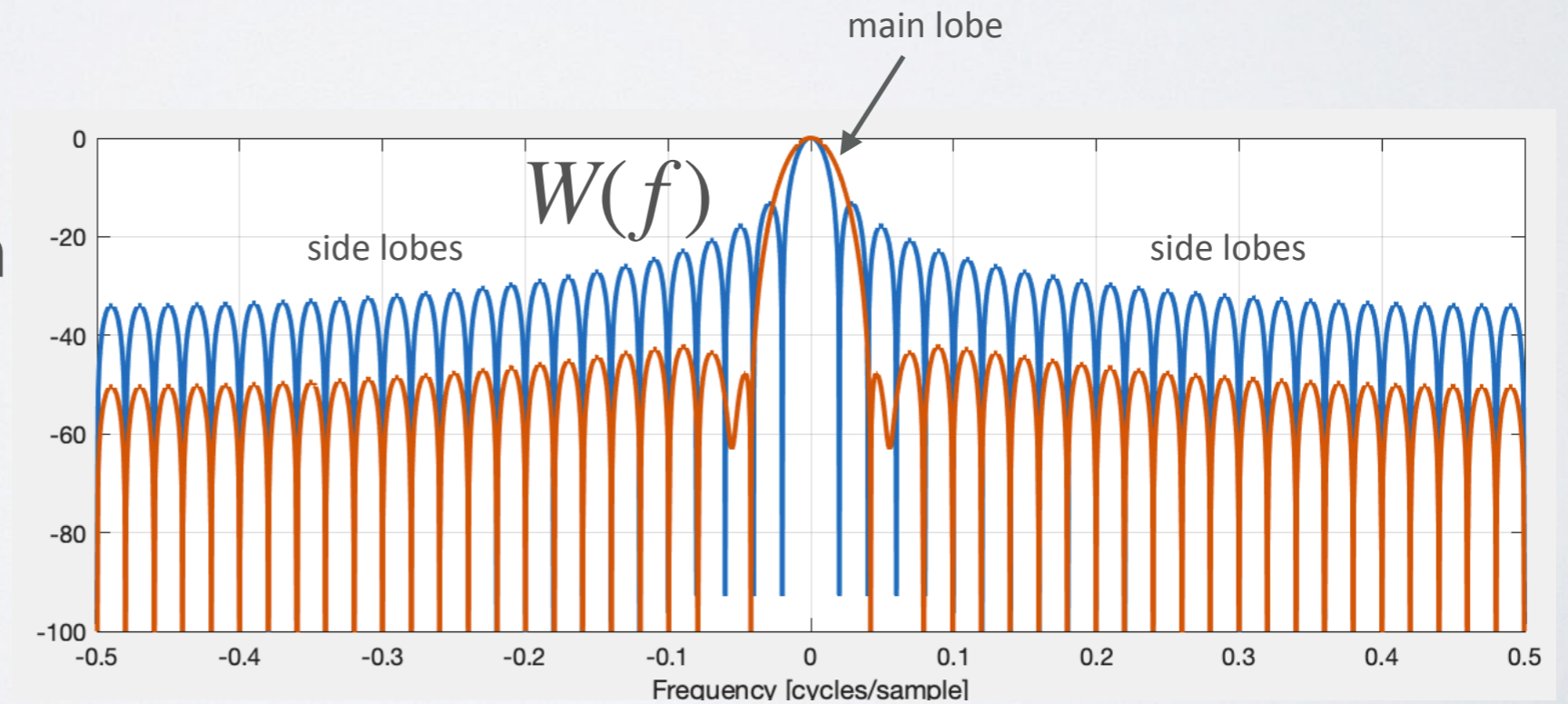
$$y[n] = x[n] \cdot w[n] \quad \longleftrightarrow \quad Y(f) = X(f) \circledast W(f)$$

Time Domain



$$W = \text{fft}(w, N)$$

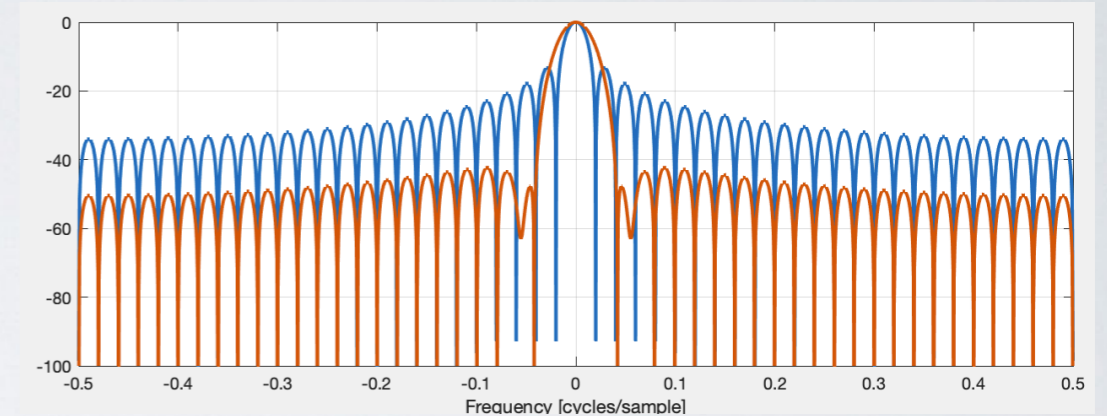
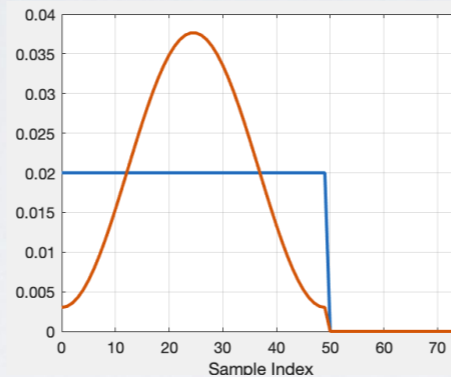
Frequency Domain



WINDOW LENGTH AND SHAPE

- Shape

- Controls side lobe height



- Side lobes control leakage (high side lobes = high leakage)

- Small signals can be hidden beneath high side lobes of strong signal

- Length and shape

- Controls main lobe width (longer window = narrower main lobe)

- Main lobe controls resolution (narrower = higher resolution)

- Resolution is ability to distinguish closely spaced sinusoids