Make a test vector

$Nt := 1024 \cdot 1024$ $jt := 0 .. Nt - 1$

$noise := rnorm(Nt, 0, 1)$ Gaussian noise with power of 1 and 0 mean

$signal_{jt} := 0.1 \cdot \cos\left(\frac{2\pi}{37} \cdot jt\right)$ Cosine wave with 37 bins period and power of 1% of noise

$S := signal + noise$ $length(S) = 1048576$

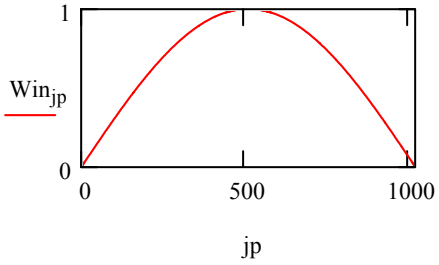
Segment length for FFT $Np := 1024$ $jp := 0 .. Np - 1$

Half the segment length $Np2 := \frac{Np}{2}$ frequency binning $jf := 0 .. Np2$

$Nsegments := \frac{Nt}{Np} \cdot 2 - 1$ Number of 50% overlapping segments $js := 0 .. Nsegments - 1$

Make window (simple cosine window in this case)

$$Win_{jp} := \cos\left[\frac{\pi}{Np} \cdot (jp - Np2)\right]$$



Cut the input vector into overlapping segments

$Sgm^{\langle js \rangle} := submatrix(S, Np2 \cdot js, Np2 \cdot js + Np - 1, 0, 0)$

$rows(Sgm) = 1024$
$cols(Sgm) = 2047$

Multiply segments by window and make FFT

$Sp^{\langle js \rangle} := fft\left(\overrightarrow{\left(Sgm^{\langle js \rangle} \cdot Win\right)}\right)$ Make the accumulated power spectrum

$$Psp_{jf} := \frac{1}{Nsegments} \cdot \left[\sum_{js} \left(Re\left(Sp_{jf, js}\right)^2 + Im\left(Sp_{jf, js}\right)^2\right)\right]$$

Vola: