

Window functions and their spectrum

```

N:=64    K:=1024    t:=dspl_linspace(0,N,N,"periodic")    hatch(xy):=

$$\sum x := \begin{cases} s := 0 \\ \text{for } n \in [1..\text{length}(x)] \\ \quad s := s + x_n \\ s \end{cases}$$


$$\text{out}_n := \begin{bmatrix} xy_{n1} & 0 \\ xy_{n1} & xy_{n2} \end{bmatrix}$$

out

window(n,k,wtype,wprm):=

$$w := \text{dspl\_window}(n, wtype, wprm)$$


$$wt := \text{augment}(t, w)$$


$$w := w \cdot \left( \sum w \right)^{-1}$$


$$\text{tail}_{K-N} := 0$$


$$w := \text{stack}(w, \text{tail})$$


$$Wf := \text{dspl\_fft\_mag}(w, N, \text{"logmag|fft\_shift"})$$


$$\begin{bmatrix} \text{hatch}(wt) \\ \text{augment}(Wf_2, Wf_1) \end{bmatrix}$$

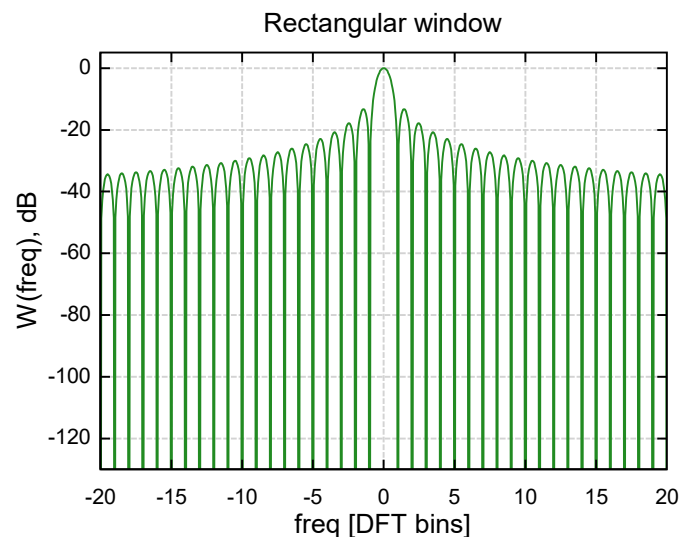
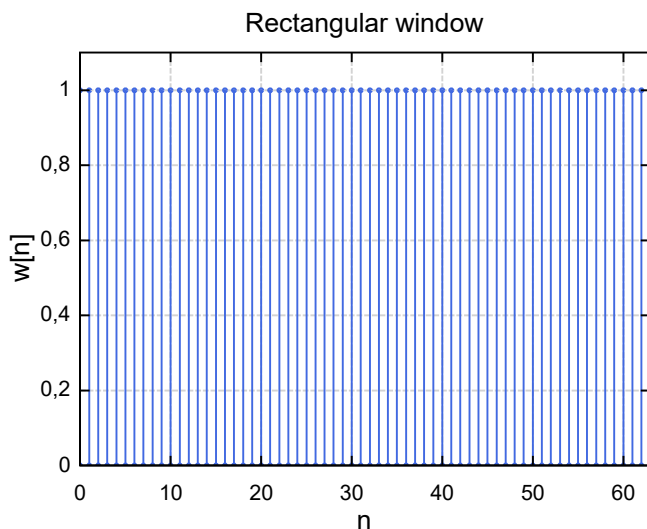

appVersion(4)="0.99.7921.69"

```

Rectangular window

```
res:=window(N,K,"periodic|rect",0)
```

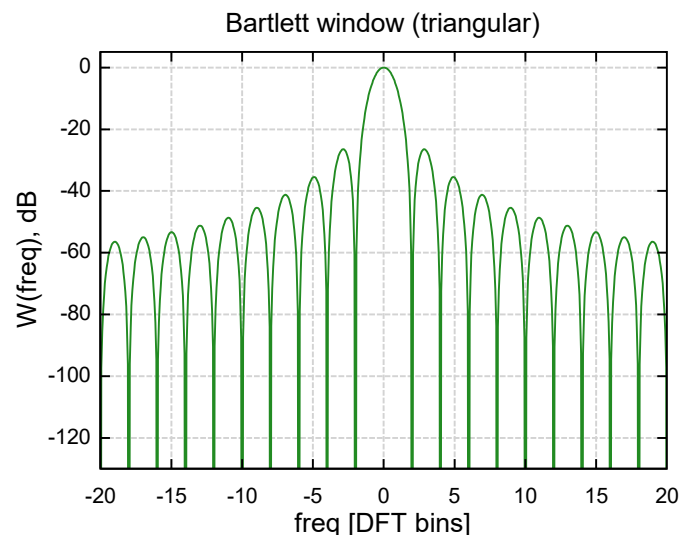
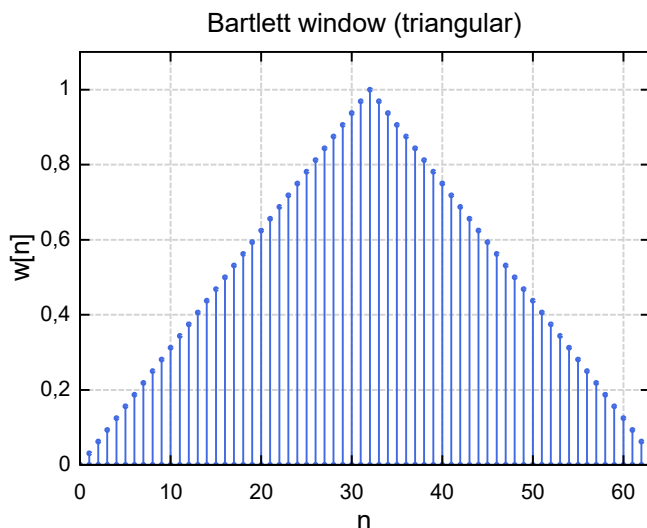
```
wt:=res1    Wf:=res2
```



Nonparametric windows

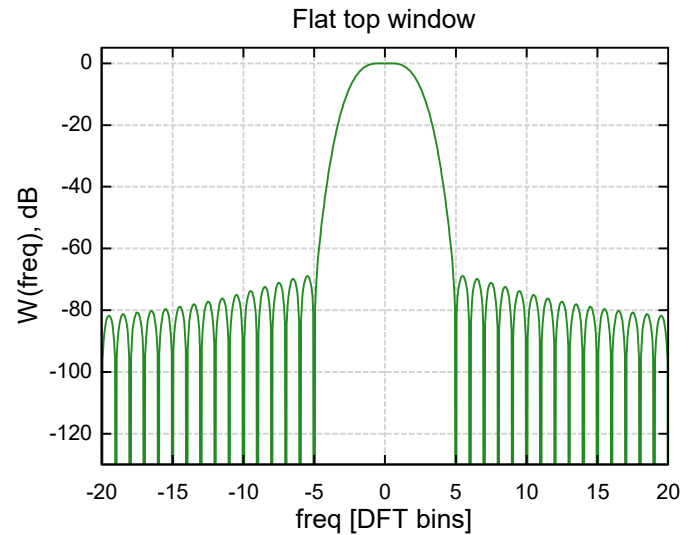
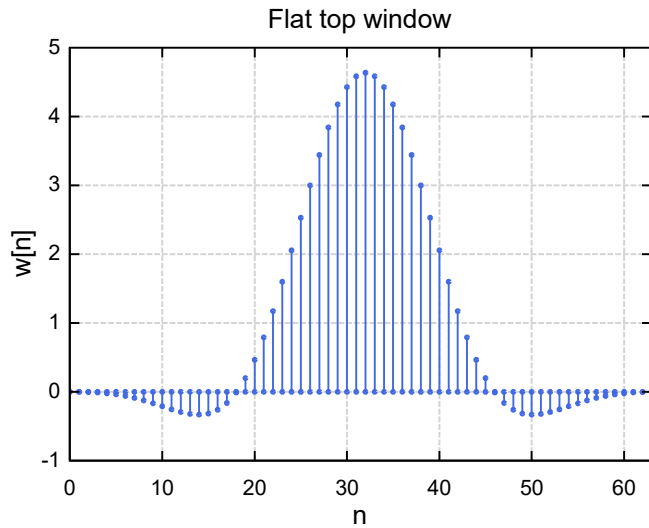
```
res:=window(N,K,"periodic|bartlett",0)
```

```
wt:=res1    Wf:=res2
```



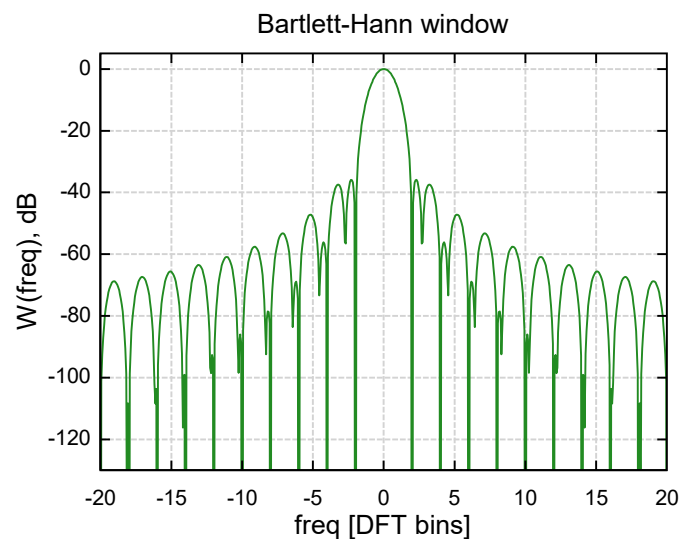
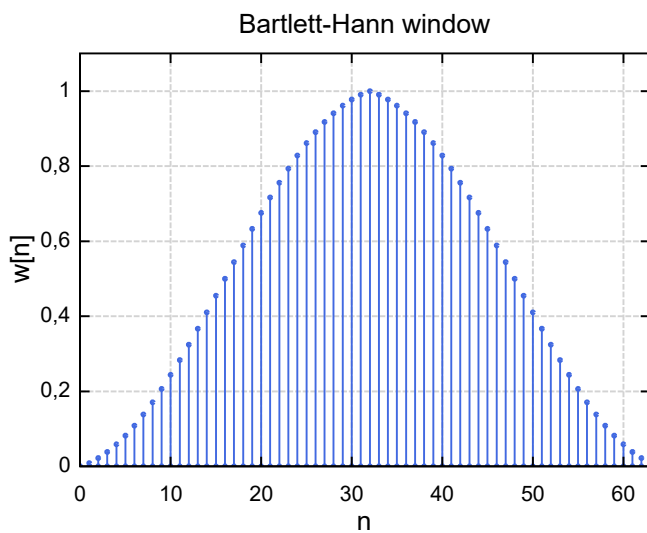
```
res := window(N, K, "periodic|flat_top", 0)
```

```
wt := res1    Wf := res2
```



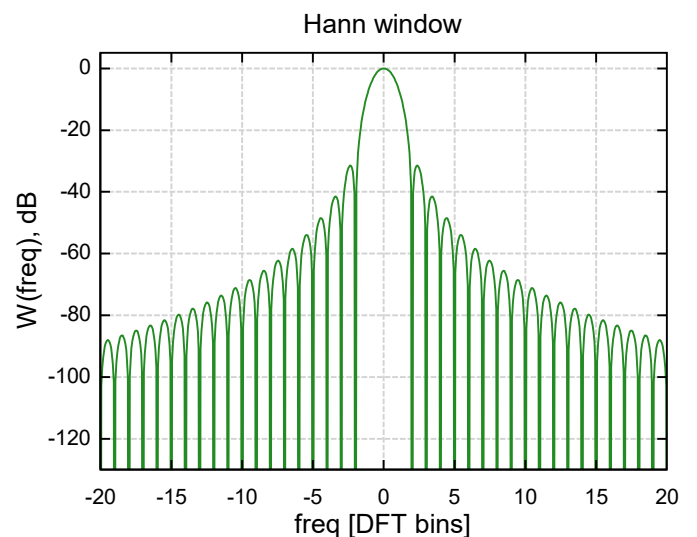
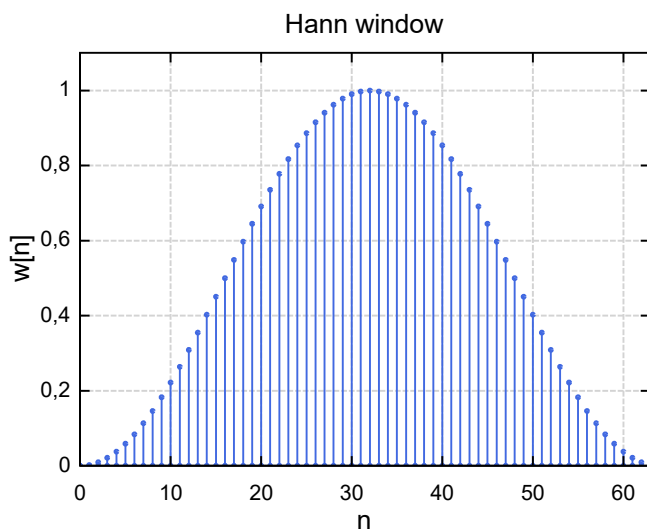
```
res := window(N, K, "periodic|bartlett_hann", 0)
```

```
wt := res1    Wf := res2
```



```
res := window(N, K, "periodic|hann", 0)
```

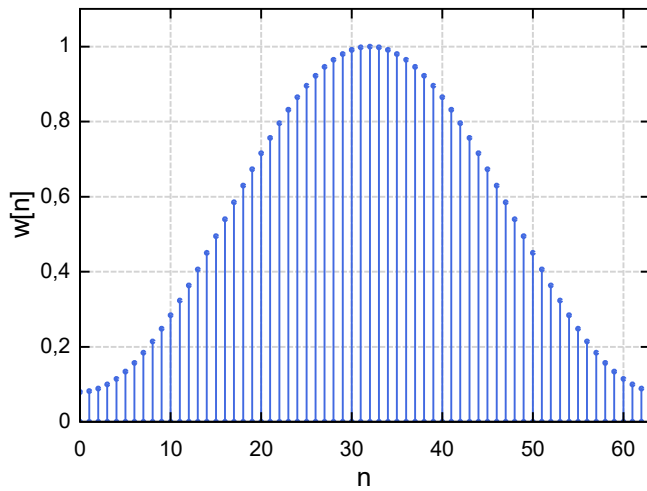
```
wt := res1    Wf := res2
```



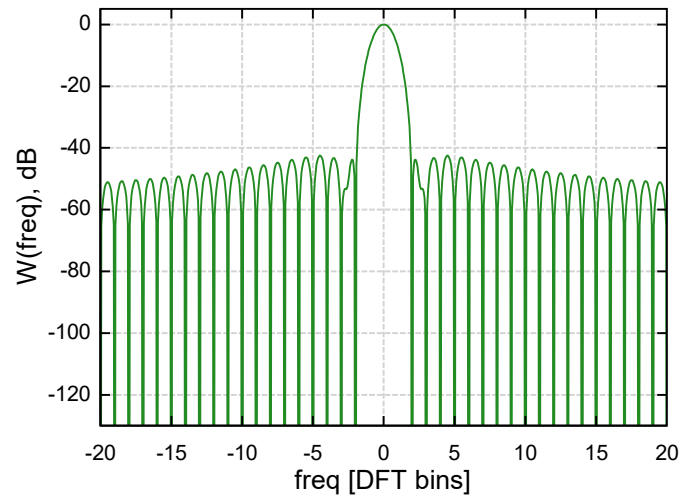
```
res := window(N, K, "periodic|hamming", 0)
```

```
wt := res1    Wf := res2
```

Hamming window



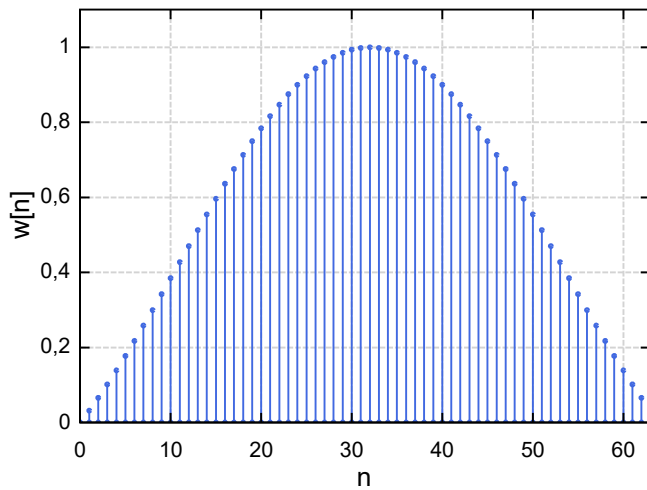
Hamming window



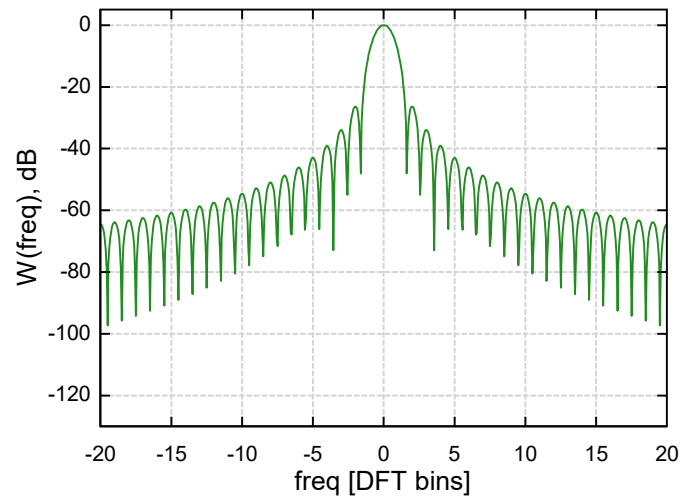
```
res := window(N, K, "periodic|lanczos", 0)
```

```
wt := res1    Wf := res2
```

Lanczos window



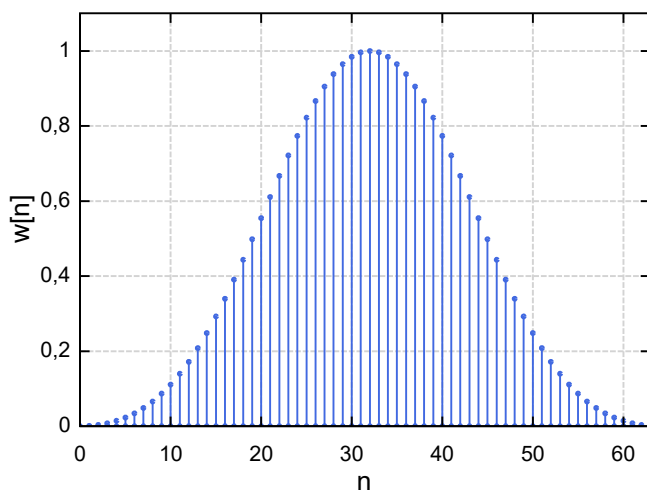
Lanczos window



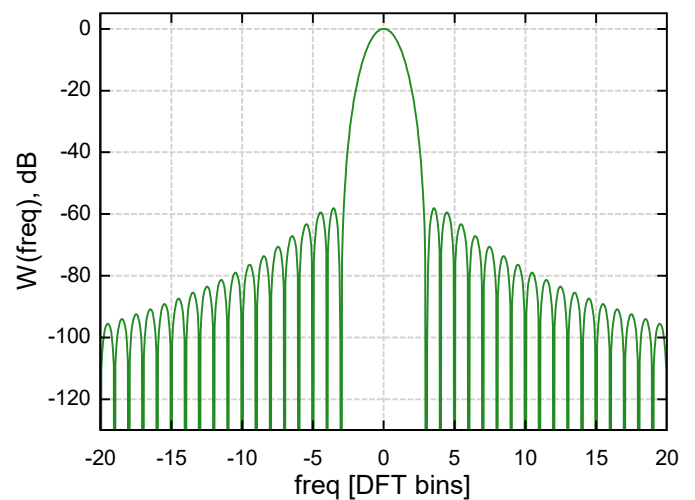
```
res := window(N, K, "periodic|blackman", 0)
```

```
wt := res1    Wf := res2
```

Blackman window

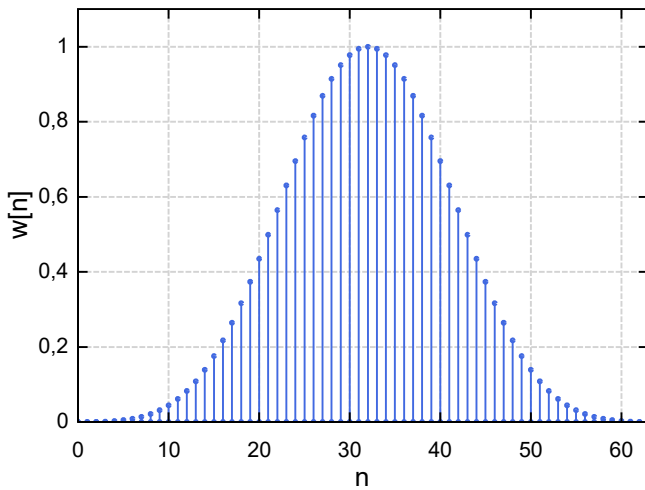


Blackman window

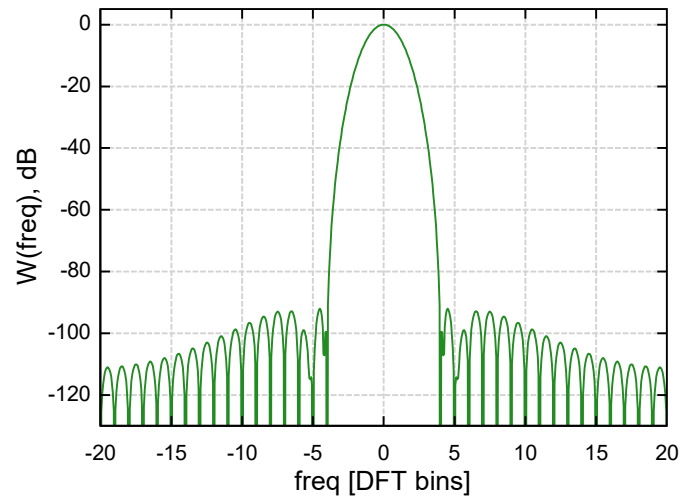


```
res := window(N, K, "periodic|blackman_harris", 0)  wt := res1  Wf := res2
```

Blackman-Harris window

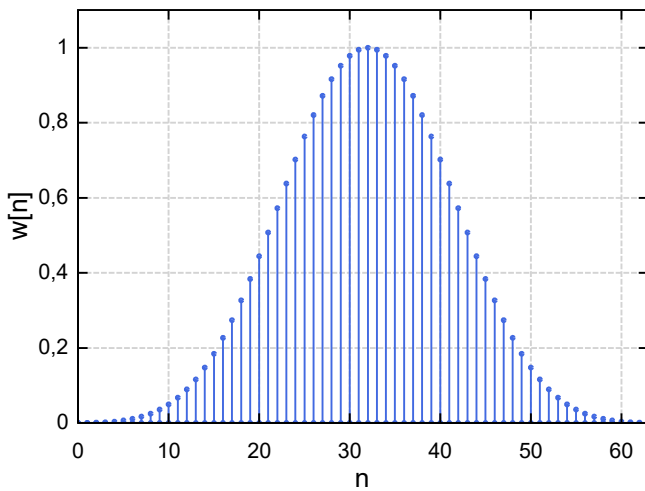


Blackman-Harris window

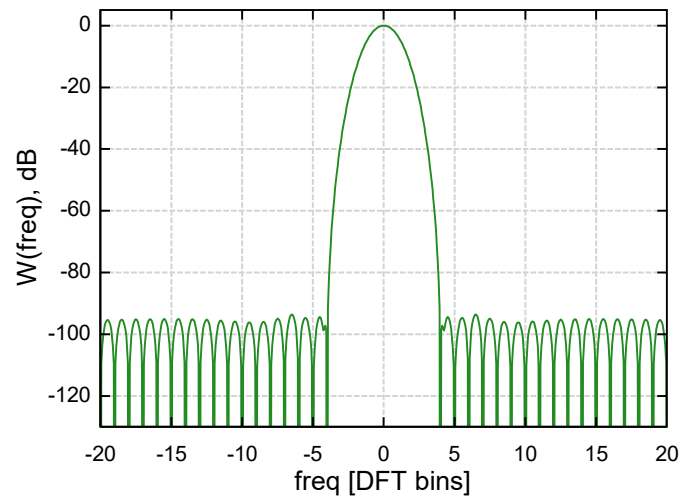


```
res := window(N, K, "periodic|blackman_nuttall", 0)  wt := res1  Wf := res2
```

Blackman-Nuttall window



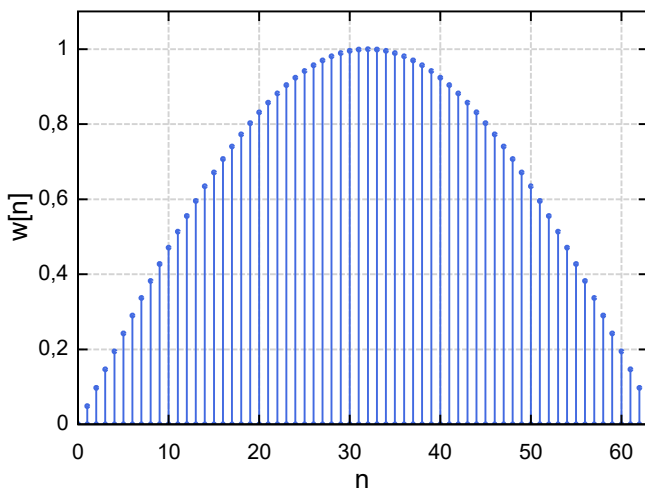
Blackman-Nuttall window



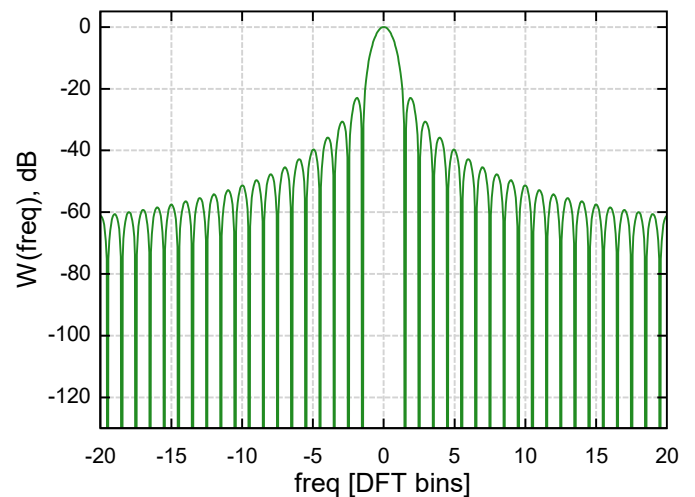
```
res := window(N, K, "periodic|cos", 0)
```

```
wt := res1  Wf := res2
```

Cosine window



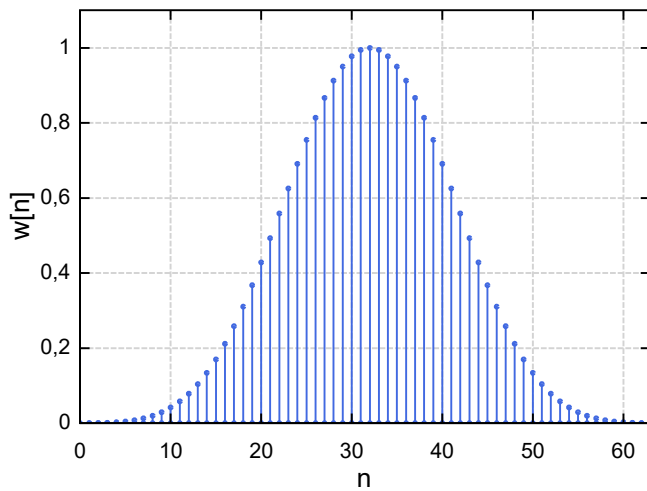
Cosine window



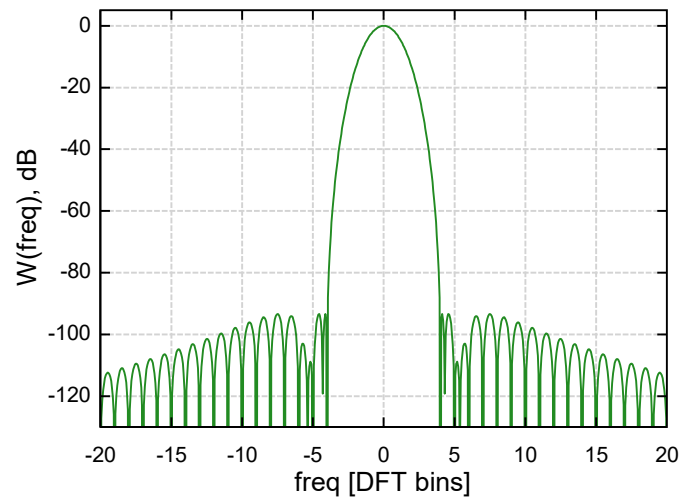
```
res := window(N, K, "periodic|nuttall", 0)
```

```
wt := res1    Wf := res2
```

Nuttall window



Nuttall window

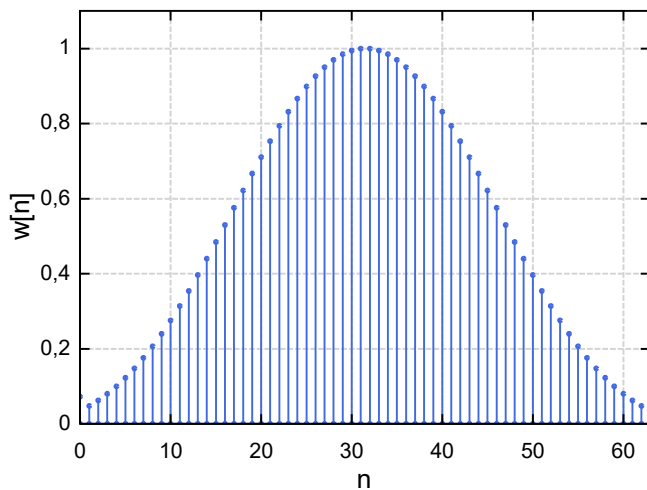


Parametric Dolph-Chebyshev windows

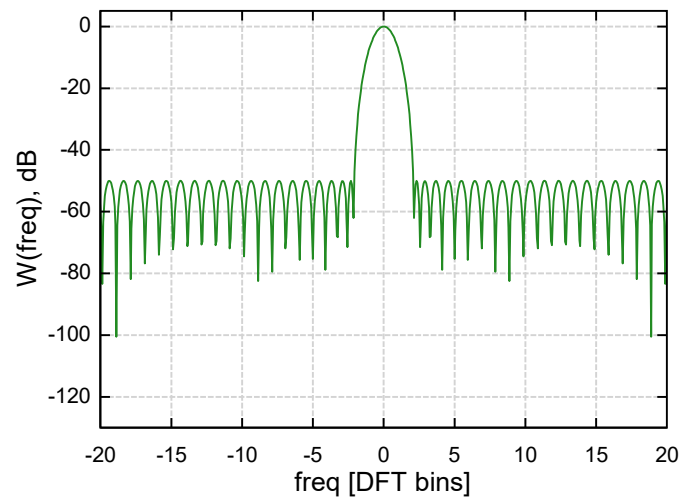
```
res := window(N, K, "periodic|cheby", 50)
```

```
wt := res1    Wf := res2
```

Dolph-Chebyshev window (Rs = 50 dB)



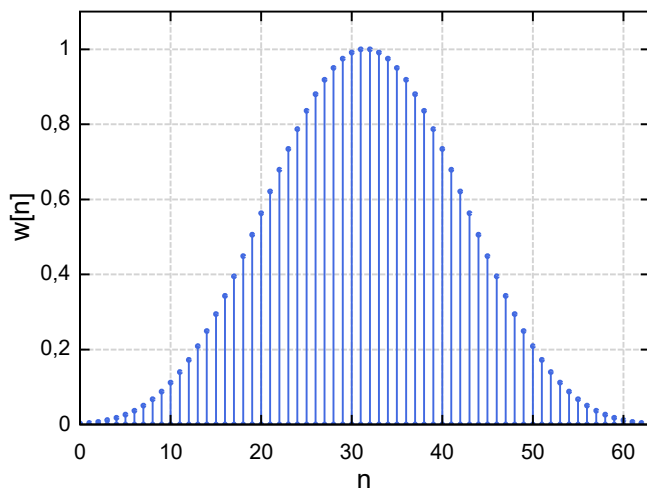
Dolph-Chebyshev window (Rs = 50 dB)



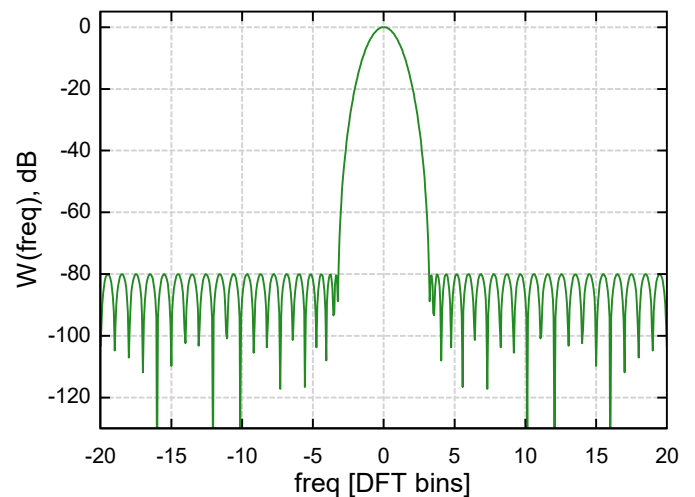
```
res := window(N, K, "periodic|cheby", 80)
```

```
wt := res1    Wf := res2
```

Dolph-Chebyshev window (Rs = 80 dB)



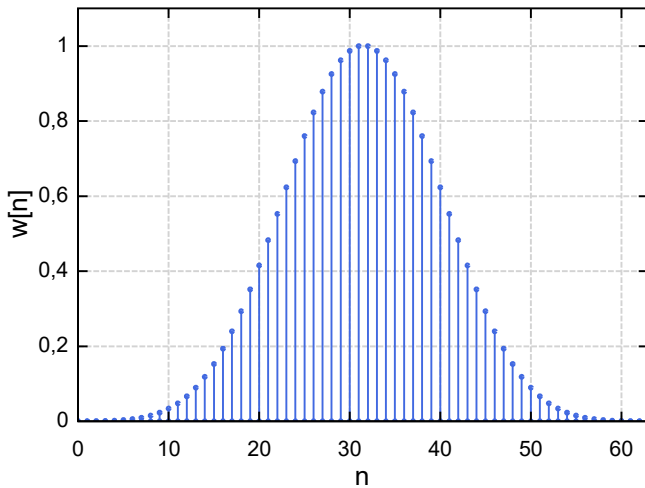
Dolph-Chebyshev window (Rs = 80 dB)



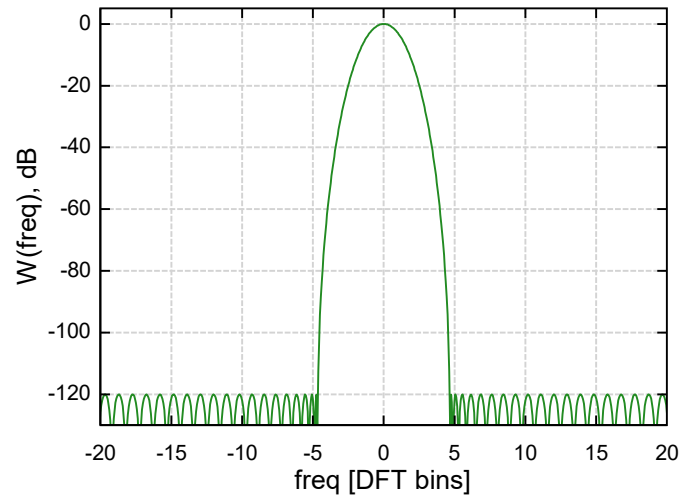
```
res := window(N, K, "periodic|cheby", 120)
```

```
wt := res1    Wf := res2
```

Dolph-Chebyshev window (Rs = 120 dB)



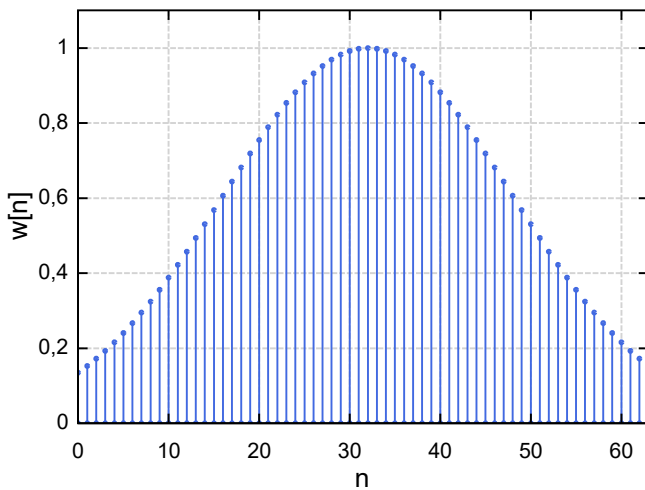
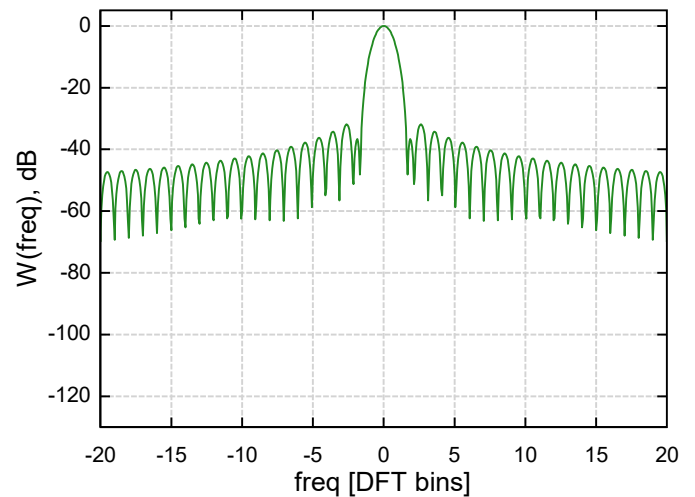
Dolph-Chebyshev window (Rs = 120 dB)



Parametric Gaussian windows

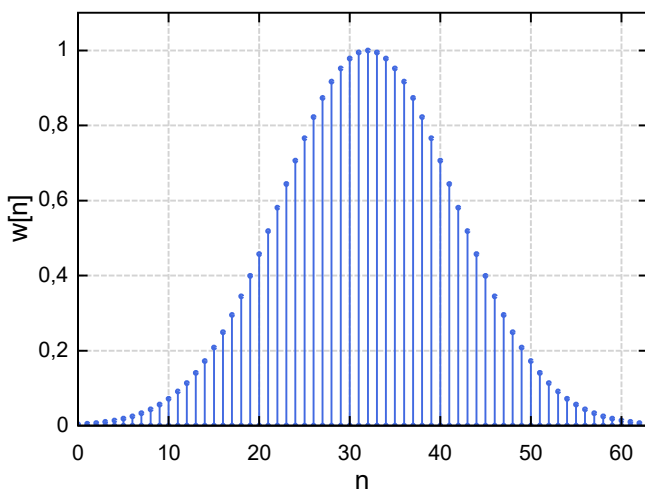
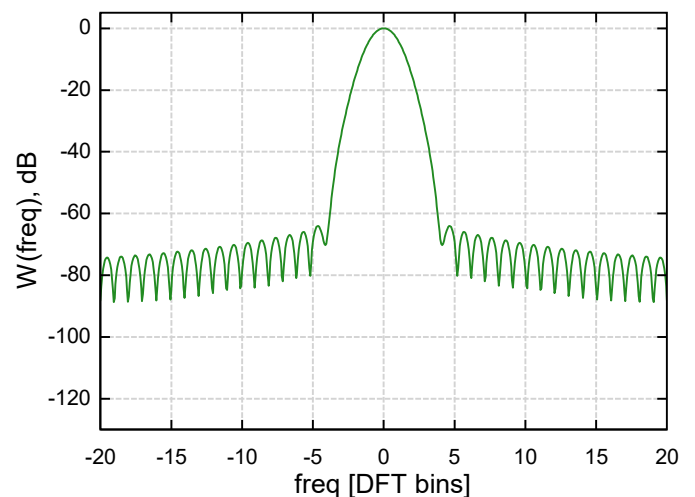
```
res := window(N, K, "periodic|gaussian", 0.5)
```

```
wt := res1    Wf := res2
```

Gaussian window ($\sigma = 0.5$)Gaussian window ($\sigma = 0.5$)

```
res := window(N, K, "periodic|gaussian", 0.3)
```

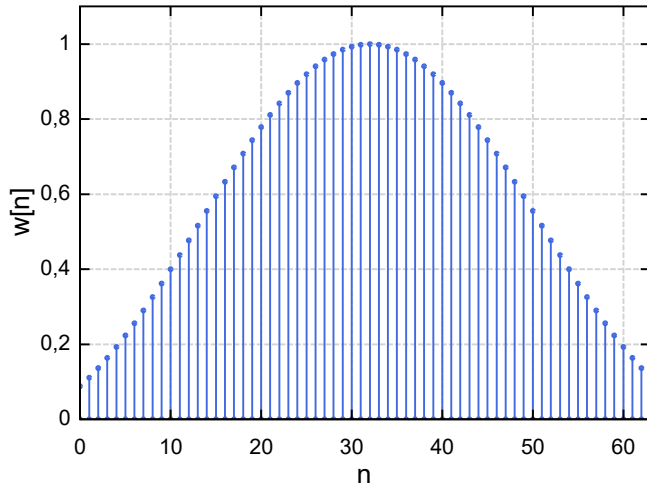
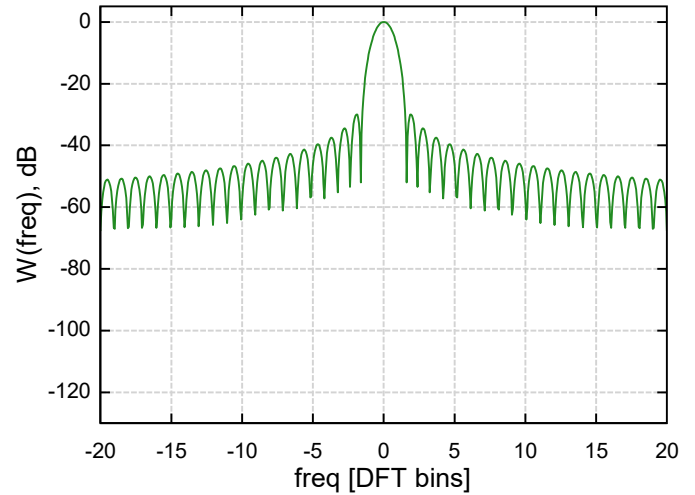
```
wt := res1    Wf := res2
```

Gaussian window ($\sigma = 0.3$)Gaussian window ($\sigma = 0.3$)

Parametric Kaiser windows

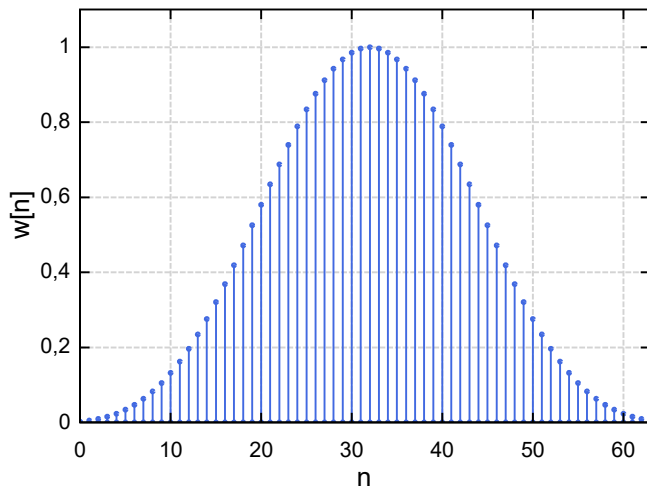
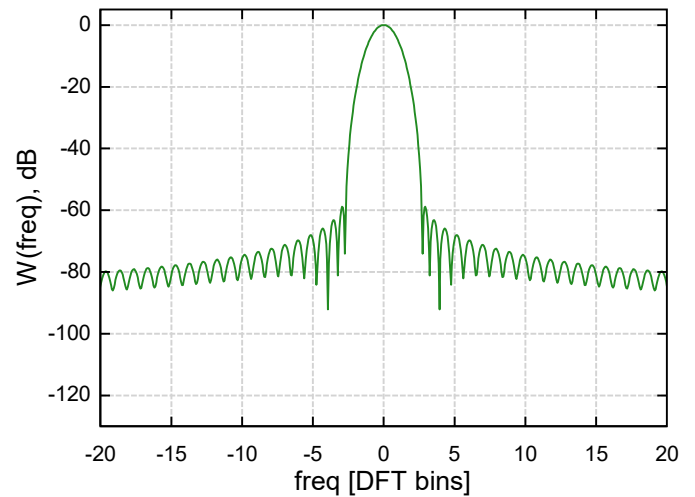
```
res := window(N, K, "periodic|kaiser", 4)
```

```
wt := res1      Wf := res2
```

Kaiser window ($\pi \cdot \alpha = 4$)Kaiser window ($\pi \cdot \alpha = 4$)

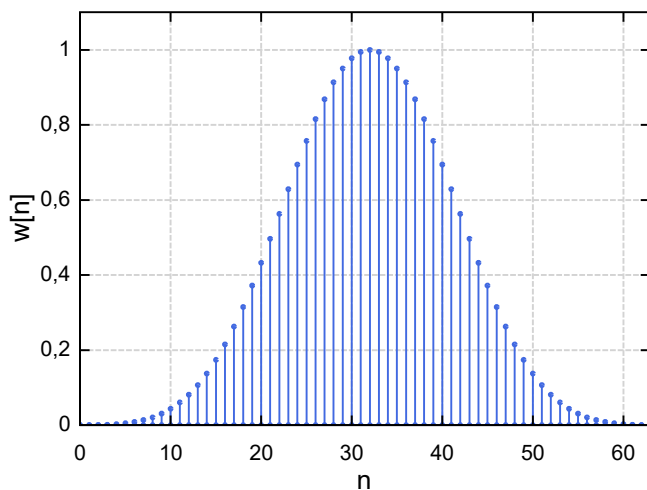
```
res := window(N, K, "periodic|kaiser", 8)
```

```
wt := res1      Wf := res2
```

Kaiser window ($\pi \cdot \alpha = 8$)Kaiser window ($\pi \cdot \alpha = 8$)

```
res := window(N, K, "periodic|kaiser", 12)
```

```
wt := res1      Wf := res2
```

Kaiser window ($\pi \cdot \alpha = 12$)Kaiser window ($\pi \cdot \alpha = 12$)