Non-power-preserving analysis windows

Rectangular windows

Full size window. Actually this is a MDCT without window.

$f(x) = 1$ for $|x| < 1$, 0 otherwise

Sometimes also written as

$f(x) = v(1/2)$ for $|x| < 1$, 0 otherwise

Half-size window.

$f(x) = 1$ for $|x| < 1/2$, 0 otherwise

The rectangular window has the smallest main lobe width, but has the worst side lobe rejection (-6dB). In other words, the rectangular window has the best frequency resolution.

Triangular (aka Bartlett) window

$f(x) = 1 - |x|$ for $|x| < 1$, 0 otherwise

Other common non power preserving windows in its discrete form where t=window length and $0 \leq k \leq t-1$:

Barlett-Hann

$$v(k) = a_0 - a_1 \left| \left(\frac{k}{t-1} - \frac{1}{2} \right) \right| + a_2 \cos \left(\frac{2\pi k}{t-1} - \frac{1}{2} \right)$$

$$a_0 = 0.62; \quad a_1 = 0.48; \quad a_2 = 0.38$$

Blackman

$$v(k) = a_0 - a_1 \cos \left(\frac{2\pi k}{t-1} \right) + a_2 \cos \left(\frac{4\pi k}{t-1} \right)$$

$$a_0 = 0.42; \quad a_1 = 0.5; \quad a_2 = 0.08$$

Blackman-Harris

$$v(k) = a_0 - a_1 \cos\left(\frac{2\pi k}{t-1}\right) + a_2 \cos\left(\frac{4\pi k}{t-1}\right) - a_3 \cos\left(\frac{6\pi k}{t-1}\right)$$

$$a_0 = 0.35875; \quad a_1 = 0.48829; \quad a_2 = 0.14128; \quad a_3 = 0.01168$$

Blackman-Nuttall

$$v(k) = a_0 - a_1 \cos\left(\frac{2\pi k}{t-1}\right) + a_2 \cos\left(\frac{4\pi k}{t-1}\right) - a_3 \cos\left(\frac{6\pi k}{t-1}\right)$$
$$a_0 = 0.3635819; a_1 = 0.4891775; a_2 = 0.1365995; a_3 = 0.0106411$$

Flat top

$$v(k) = a_0 - a_1 \cos\left(\frac{2\pi k}{t-1}\right) + a_2 \cos\left(\frac{4\pi k}{t-1}\right) - a_3 \cos\left(\frac{6\pi k}{t-1}\right) + a_4 \cos\left(\frac{8\pi k}{t-1}\right)$$

$$a_0 = 1; \quad a_1 = 1.93; \quad a_2 = 1.29; \quad a_3 = 0.388; \quad a_4 = 0.322$$

Gauss

$$v(k) = e^{-\frac{1}{2}\left(a\frac{k-t/2}{t/2}\right)^2}$$

$$a \leq 2$$

Hamming

$$v(k) = a_0 - a_1 \cos\left(\frac{2\pi k}{t-1}\right)$$

$$a_0 = \frac{25}{46}; \quad a_1 = \frac{21}{46}$$

Hann

$$v(k) = \left(1 - \cos\left(\frac{2\pi k}{t-1}\right)\right)/2$$

Hanning

$$v(k) = a_0 - a_1 \cos\left(\frac{2\pi k}{t-1}\right)$$

$$a_0 = 0.5; \quad a_1 = 0.5$$

Bessel

Power-preserving analysis windows

Sine window

$f(x) = \sin(w/2)$

Kaiser-Bessel-derived (KBD) window

For $0 = x = 1$:

$f(x) = \text{Int}$

For $x > 1$:

$f(x) = 0$

For $x < 0$:

$$f(x) = f(-x)$$