Splitting Positive & Negative Frequency Components for
Advanced Diversity AM Reception

J.A. Crawford June 10, 1993

Want to consider looking at the Hilbert transform for doing the spiffy AM detection where upper and lower sidebands must be separated out.

$jx := 2\cdot\pi\cdot\sqrt{-1}$

$N := 21$

$pp := 0..N-1$

$\beta := 3$ $\quad$ $I0const := I0(\beta)$ $\quad$ Kaiser Filter Parameter

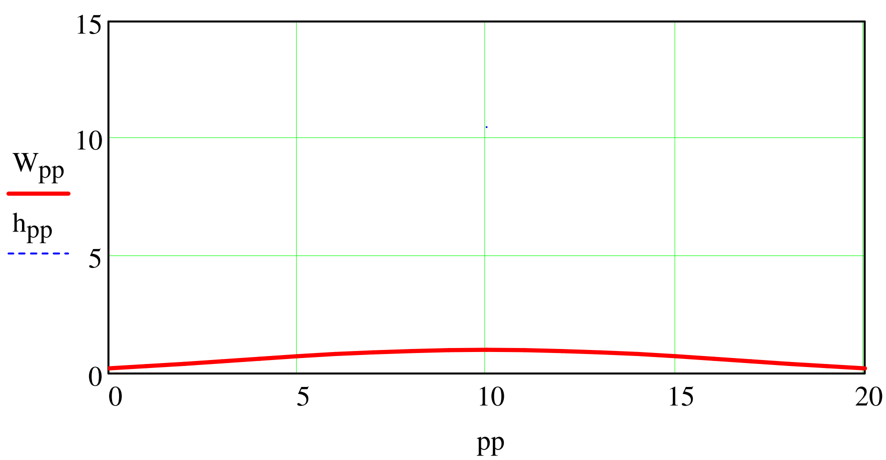
$fc := 10.5$

$$ni_{pp} := -\frac{N-1}{2} + pp + 0.0001$$

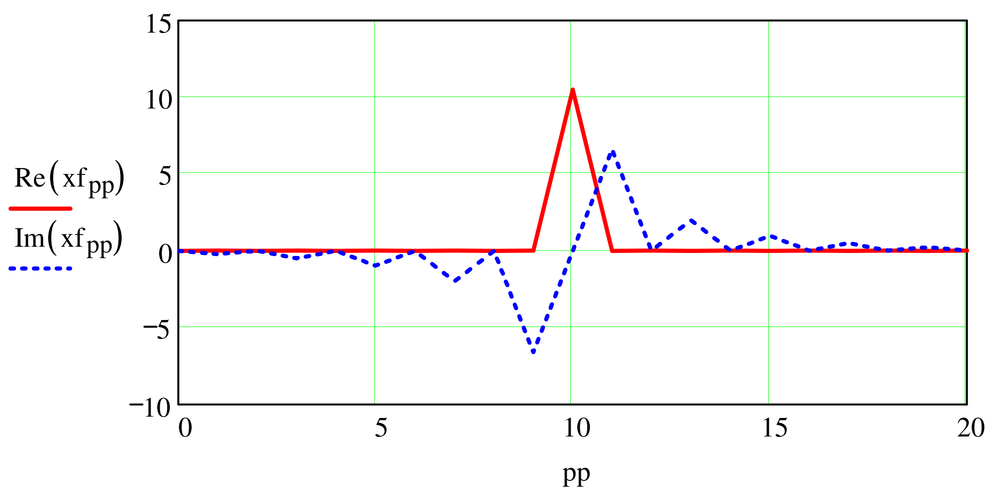
$$W_{pp} := \frac{I0\left[\beta\cdot\sqrt{1-\left[\frac{2\cdot ni_{pp}}{(N-1)}\right]^2}\right]}{I0const}$$

$$h_{pp} := e^{jx\cdot\left(\frac{fc}{2}\right)\cdot\frac{ni_{pp}}{N}}\cdot\frac{\sin\left(\pi\cdot fc\cdot\frac{ni_{pp}}{N}\right)}{\pi\cdot\frac{ni_{pp}}{N}}$$

$$h_{\left|\frac{N-1}{2}\right|} := fc$$



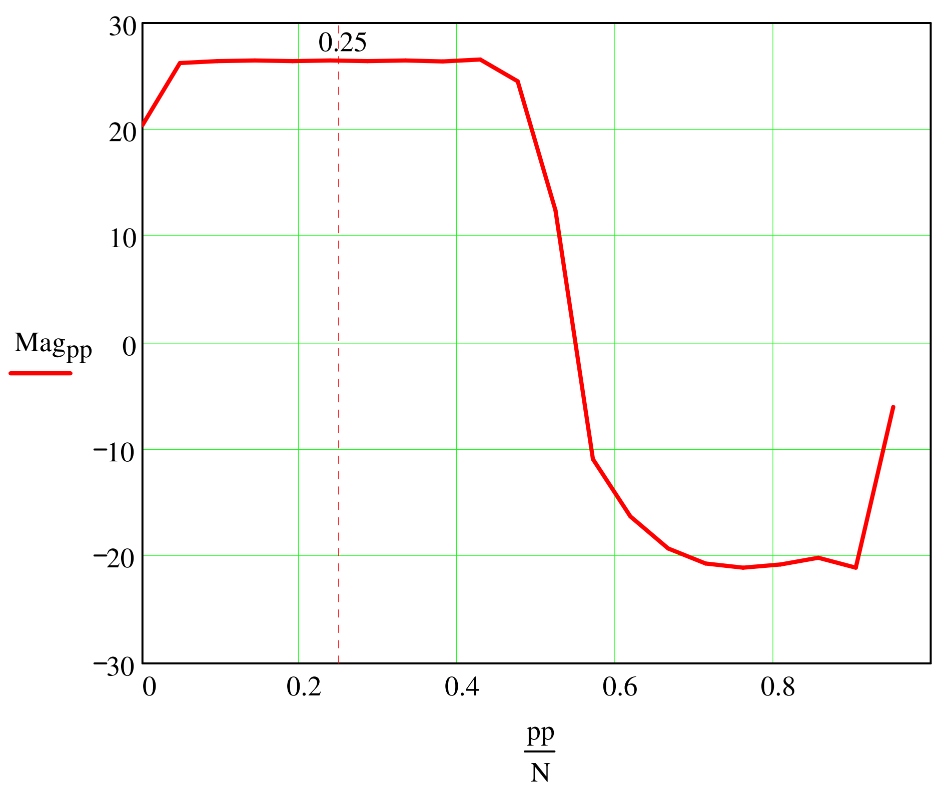
$xf_{pp} := W_{pp} \cdot h_{pp}$ Apply Kaiser window to desired response




$mm := 0..N-1$

$$FT_{pp} := \sum_{mm} \left[ xf_{mm} \cdot e^{\left(\frac{jx \cdot mm \cdot pp}{N}\right) \cdot (-1)} \right]$$

$$Mag_{pp} := 10 \cdot \log\left[\left(\left|FT_{pp}\right|\right)^2\right]$$



Look at amplitude out for positive & negative freq components

$ii := 0 .. 200$

$xp_{ii} := e^{jx \cdot 1 \cdot \frac{ii}{N} \cdot (1)}$ $xn_{ii} := e^{jx \cdot 1 \cdot \frac{ii}{N} \cdot (-1)}$

$jj := 0 .. 150$

$$yp_{jj} := \frac{\sum_{pp} \left( xf_{pp} \cdot xp_{jj+50-pp} \right)}{N} \qquad yn_{jj} := \frac{\sum_{pp} \left( xf_{pp} \cdot xn_{jj+50-pp} \right)}{N}$$