Channel Filtering FIRs (Interpolate Between Rate 1/2 Filters)

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Extended for klpf9-17

Use Associate File Name command from F
pulldown menu to assign file name to F
coefficient output file/variable 'xf'.

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

$N := 63$ Number of Taps to Use in FIR

$pp := 0 .. N - 1$

$\beta := 5$ $I0const := I0(\beta)$ Kaiser Filter Parameter

$fc := \frac{N}{2}$

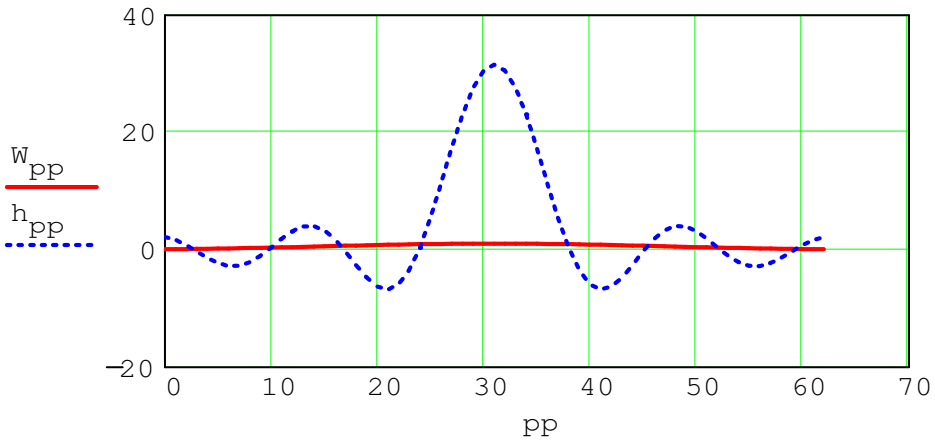
$Nx := \frac{N}{2 \cdot 0.1414}$ Bandwidth Determining Factor > N/2

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

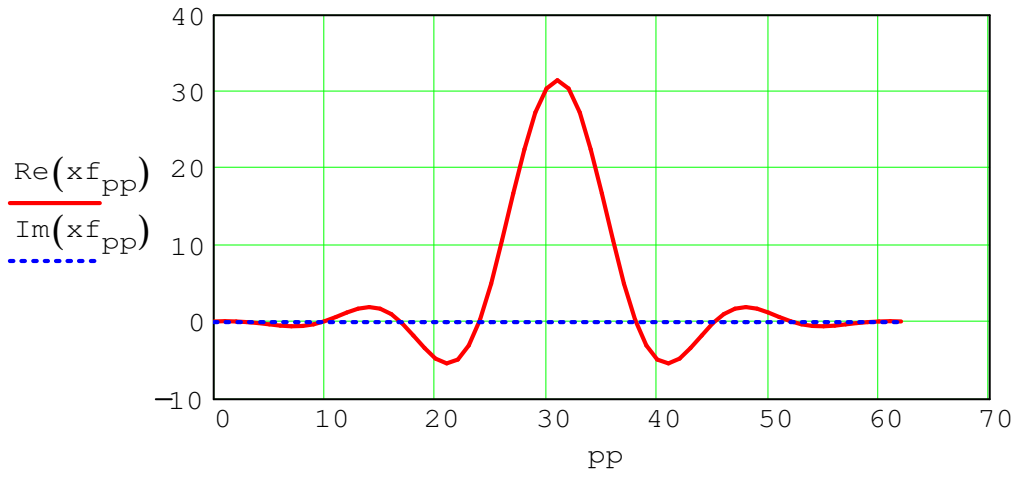
$W_{pp} := \frac{I0\left[\beta \cdot \sqrt{1 - \left[\frac{2 \cdot ni_{pp}}{(N-1)}\right]^2}\right]}{I0const}$

$h_{pp} := \frac{\sin\left(\pi \cdot fc \cdot \frac{ni_{pp}}{Nx}\right)}{\pi \cdot \frac{ni_{pp}}{Nx}}$

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



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



$mm := 0 .. N - 1$

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

$Mag_{pp} := |FT_{pp}|$

$mmax := max(Mag)$ $mmax = 223.083493$

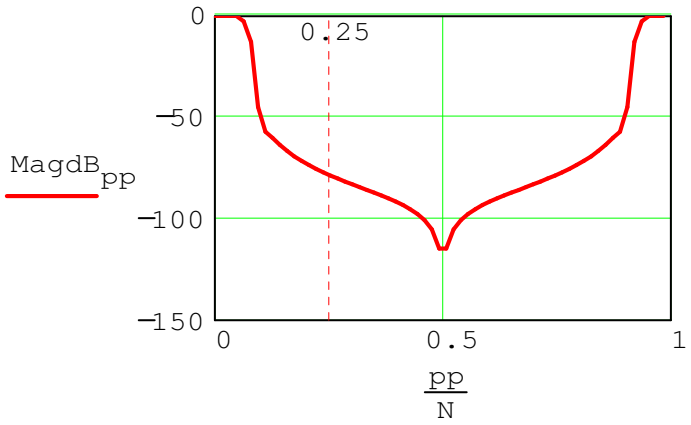
$$Mag_{pp} := \left(\frac{|FT_{pp}|}{mmax} \right)^2 \qquad MagdB_{pp} := 10 \cdot \log(Mag_{pp})$$

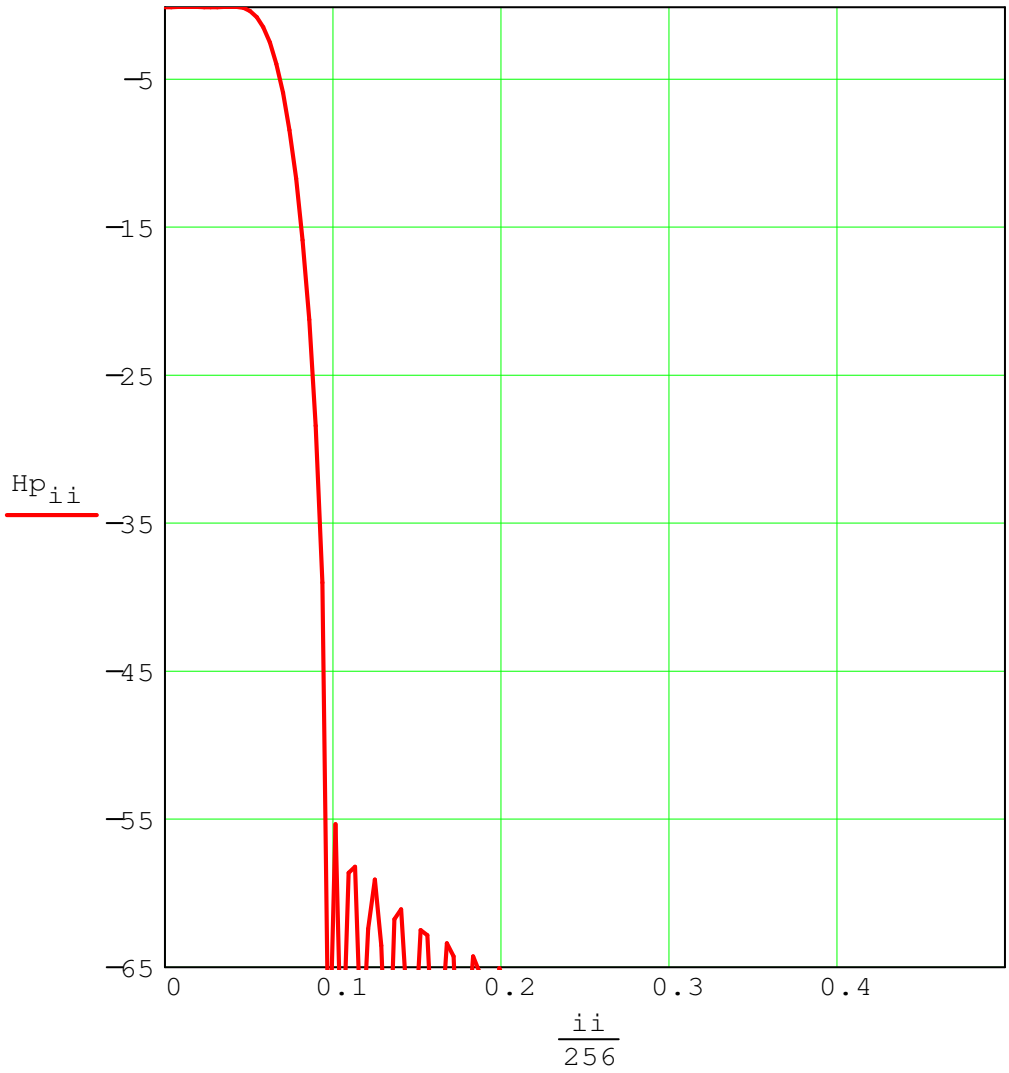
$ii := 0 .. 127$

$$z_{ii} := e^{jx \cdot \frac{ii}{256}}$$

$$H_{ii} := \sum_{pp} \left[xf_{pp} \cdot (z_{ii})^{-pp} \right] \qquad Hm_{ii} := |H_{ii}| \qquad Hmax := max(Hm)$$

$$Hp_{ii} := 10 \cdot \log\left[\left(\frac{Hm_{ii}}{Hmax} \right)^2 \right]$$





$$xt := \sum_{pp} |xf_{pp}|$$

$$xfn_{pp} := \frac{xf_{pp}}{xt}$$

Look at Noise Bandwidth

$$BW := \frac{\sum_{ii} (Hm_{ii})^2}{256 \cdot Hmax^2} \cdot 2 \qquad BW = 0.13236$$

BW is bandwidth compared to having no filter.

$$xsum := \sum_{pp} |xf_{pp}|$$

$$xsum = 326.060455$$

$$xnorm_{pp} := floor\left(\frac{xf_{pp}}{xsum} \cdot 2^{15} + 0.5\right)$$

Normalized Coefficients for 16 bit coefficients

$xnorm =$

	0
0	8h
1	9h
2	5h
3	-3h
4	-11h
5	-21h
6	-31h
7	-39h
8	-35h
9	-1eh
10	0ah
11	41h
12	7ch
13	0adh
14	0c2h
15	0adh

$$WRITE(xf) := xnorm_{pp}$$

$$jj := 0 .. 127$$

$$WRITE(dbc) := floor(Hp_{jj} \cdot 4)$$

$Hp \equiv$ "KLPF1.FRQ"

$xnorm \equiv$ "KLPF17.DAT"

$xf \equiv$ "KLPF9.DAT"

$dbc \equiv$ "K17DBC.DAT"

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ile
IR
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