

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

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

$N := 31$ Number of Taps to Use in FIR

$$pp := 0.. N-1$$

$\beta := 4$ $I0const := I0(\beta)$ Kaiser Filter Parameter

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

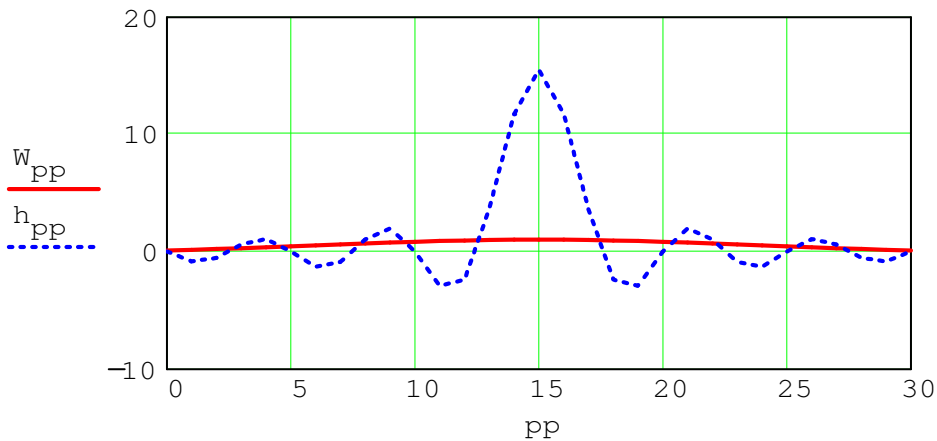
$Nx := \frac{N}{2 \cdot 0.4}$ Bandwidth Determining Factor $> N/2$

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

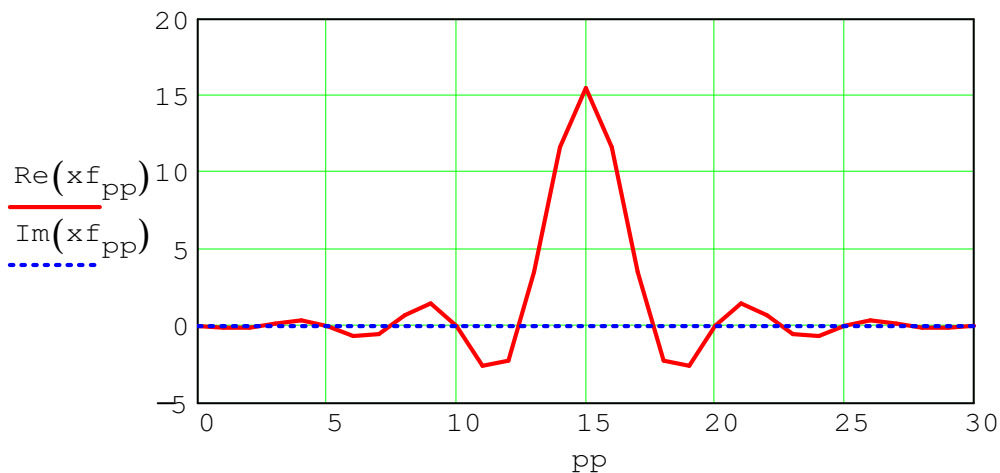
$$W_{pp} := \frac{I0 \left[\beta \cdot \sqrt{1 - \left[\frac{2 \cdot ni_{pp}}{N-1} \right]^2} \right]}{I0const}$$

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

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



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



$mm := 0 .. N - 1$

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

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

$$mmax := \max(Mag) \quad mmax = 38.854753$$

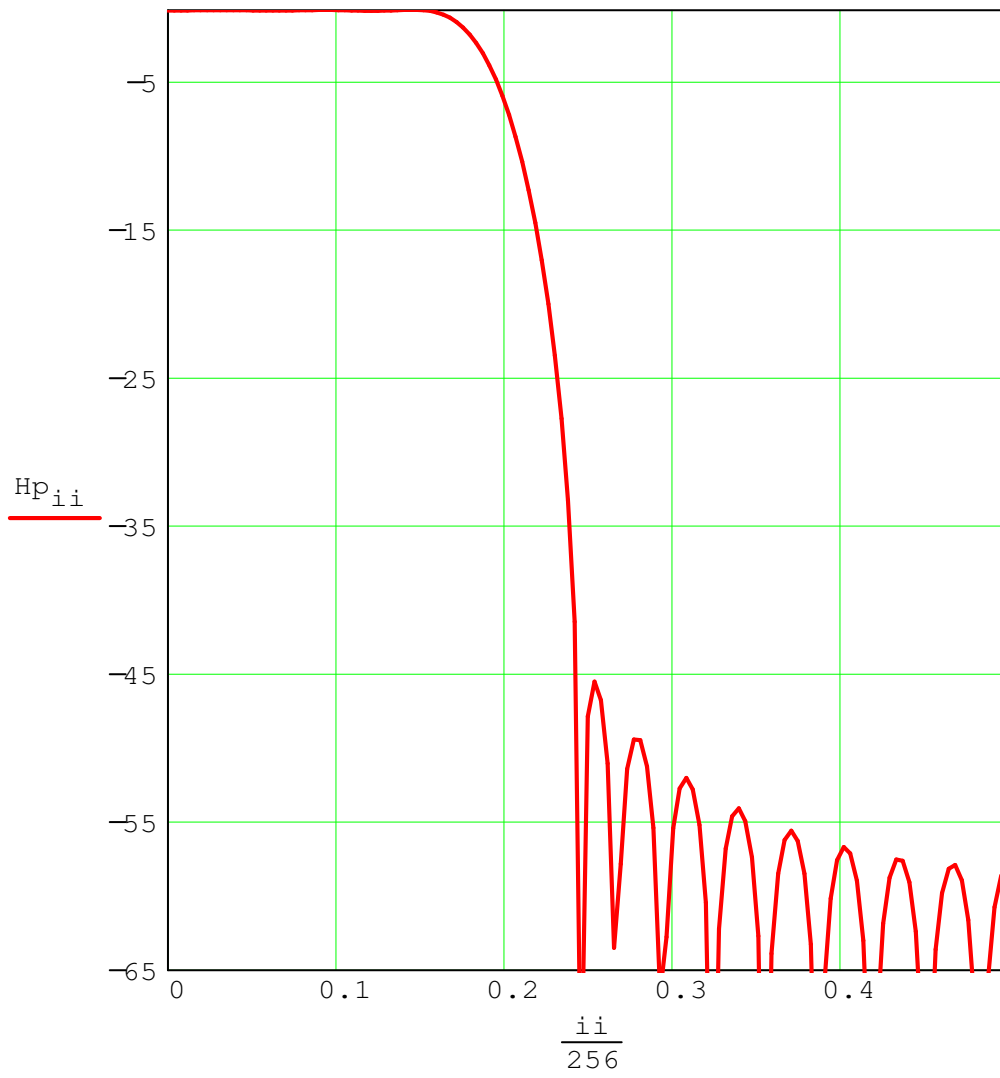
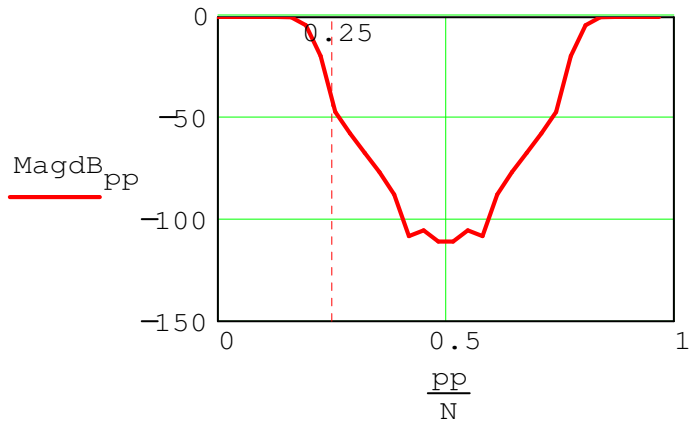
$$Mag_{pp} := \left(\frac{|FT_{pp}|}{mmax} \right)^2 \quad MagdB_{pp} := 10 \cdot \log(Mag_{pp})$$

$ii := 0 .. 127$

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

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

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



$$x_t := \sum_{pp} |x_{f_{pp}}|$$

$$x_{fn_{pp}} := \frac{x_{f_{pp}}}{x_t}$$

Look at Noise Bandwidth

$$BW := \frac{\sum_{ii} (H_{m_{ii}})^2}{256 \cdot H_{max}^2} \cdot 2 \quad BW = 0.377587$$

BW is bandwidth compared to having no filter.

$H_p \equiv \text{"KLPF1.FRQ"}$