

Targets for Neville Thiele Method

$$s := j \cdot \frac{f}{f_c}$$

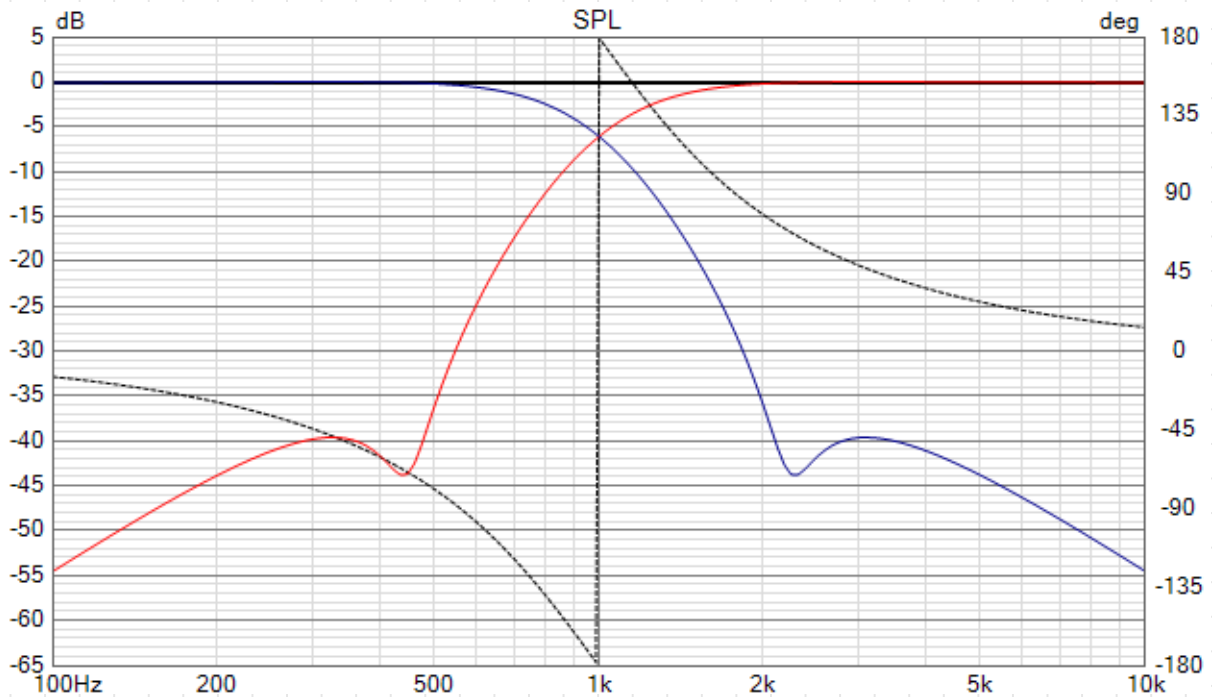
k : ratio of notch frequencies to the crossover transition frequency ($\sqrt{5}$)

q : quality factor (0.16)

NTM 4th order :

$$\text{Low_pass_NTM4} := \frac{1 + q \cdot k \cdot s + (k \cdot s)^2}{\left(1 + \sqrt{2 \cdot (1 - k^2)} \cdot s + s^2\right)^2}$$

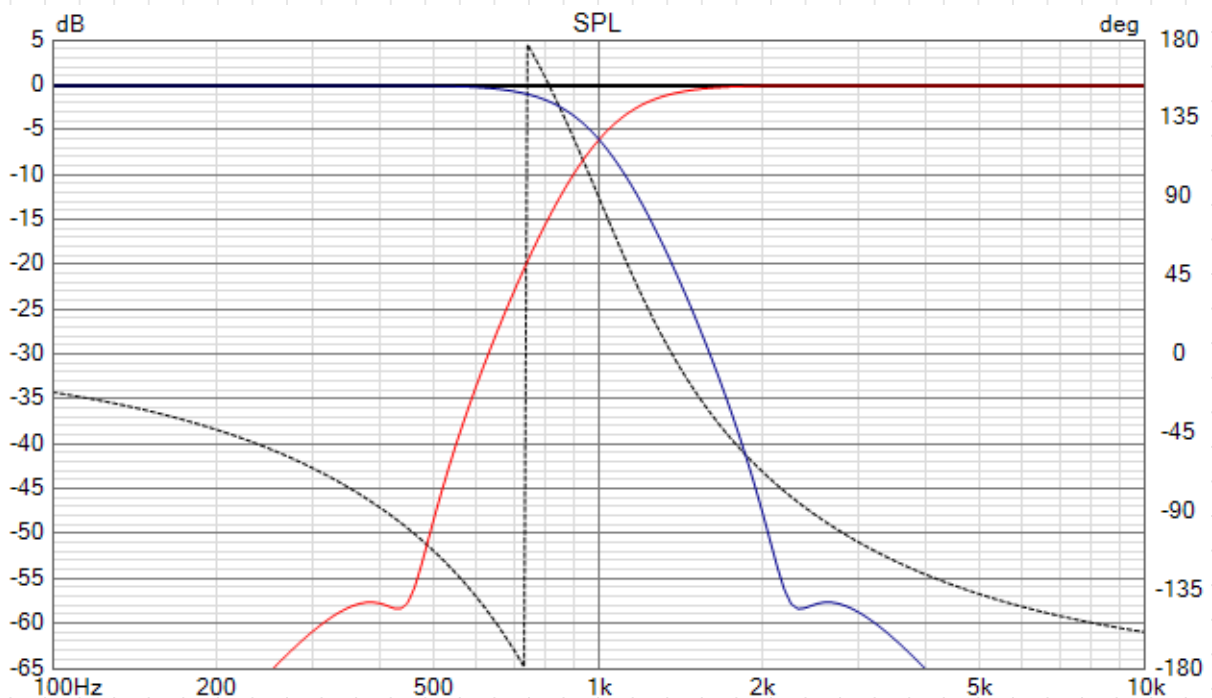
$$\text{High_pass_NTM4} := \frac{(k^2 + q \cdot k \cdot s + s^2) \cdot s^2}{\left(1 + \sqrt{2 \cdot (1 - k^2)} \cdot s + s^2\right)^2}$$



NTM 6th order :

$$\text{Low_pass_NTM6} := \frac{1 + q \cdot k \cdot s + (k \cdot s)^2}{\left((1 + s) \cdot \left(1 + \sqrt{1 - k^2} \cdot s + s^2\right)\right)^2}$$

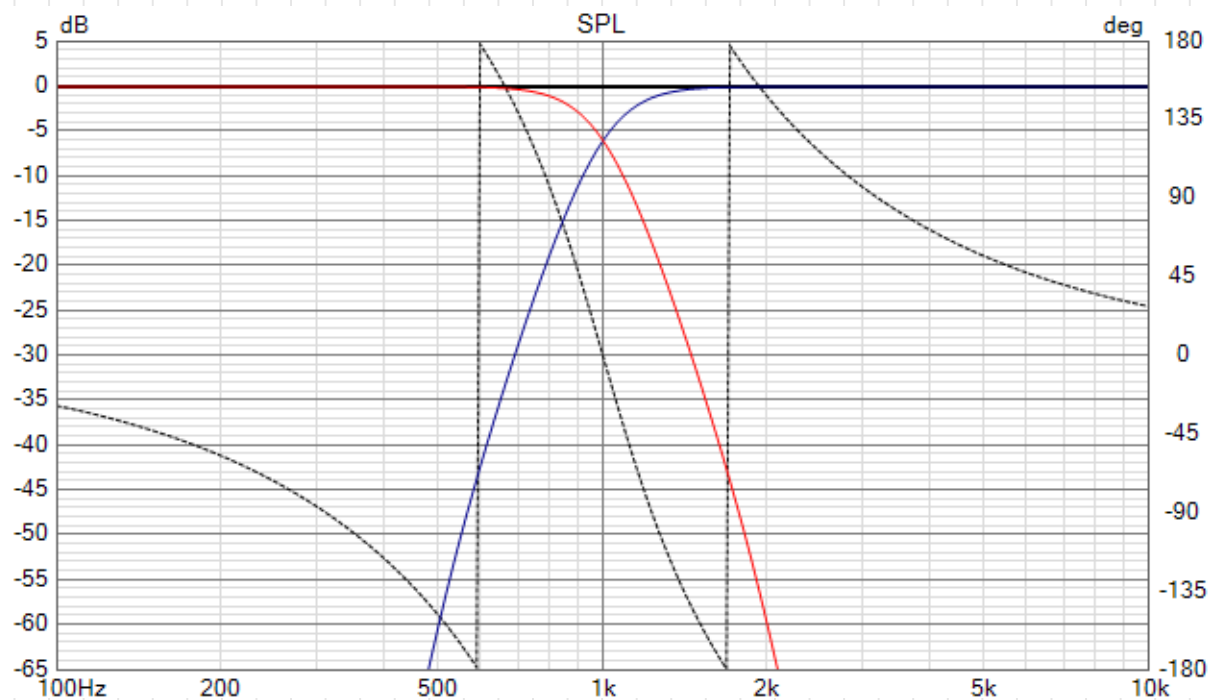
$$\text{High_pass_NTM6} := \frac{-(k^2 + q \cdot k \cdot s + s^2) \cdot s^4}{\left((1 + s) \cdot \left(1 + \sqrt{1 - k^2} \cdot s + s^2\right)\right)^2}$$



NTM 8th order :

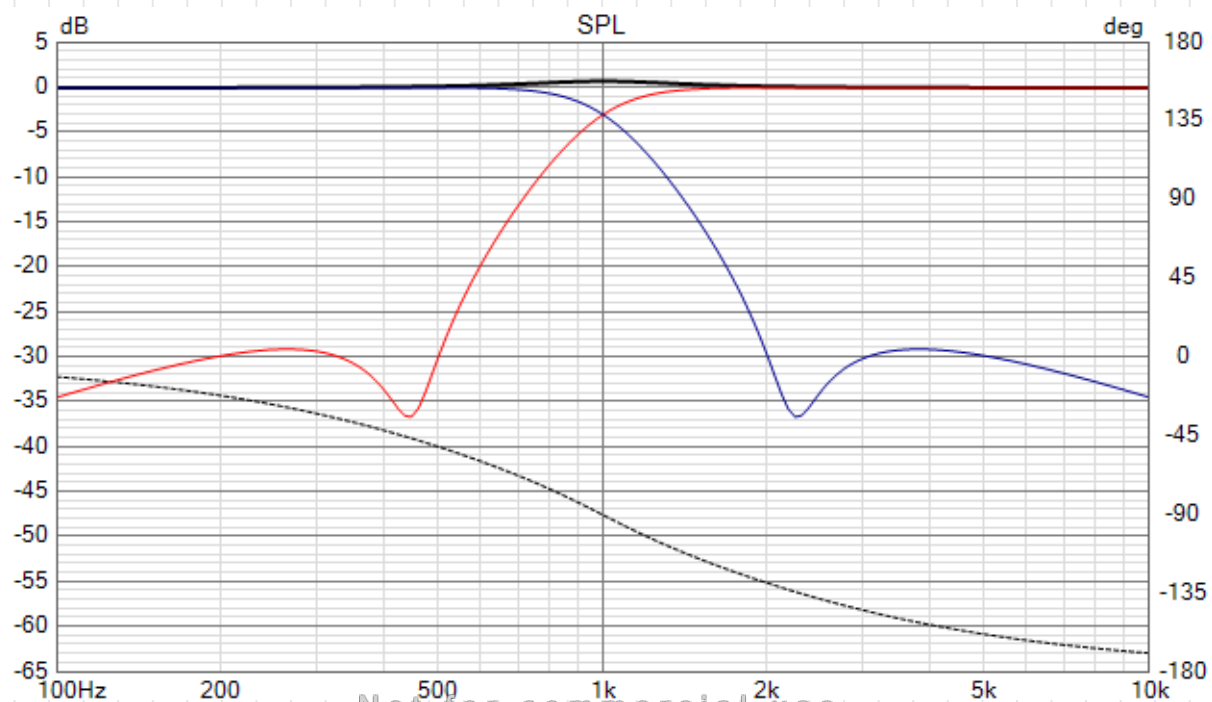
$$\text{Low_pass_NTM8} := \frac{1 + q \cdot k \cdot s + (k \cdot s)^2}{\left(\left(1 + \sqrt{\frac{4 - k^2 + \sqrt{8 + k^4}}{2}} \cdot s + s^2 \right) \cdot \left(1 + \sqrt{\frac{4 - k^2 - \sqrt{8 + k^4}}{2}} \cdot s + s^2 \right) \right)^2}$$

$$\text{High_pass_NTM8} := \frac{(k^2 + q \cdot k \cdot s + s^2) \cdot s^6}{\left(\left(1 + \sqrt{\frac{4 - k^2 + \sqrt{8 + k^4}}{2}} \cdot s + s^2 \right) \cdot \left(1 + \sqrt{\frac{4 - k^2 - \sqrt{8 + k^4}}{2}} \cdot s + s^2 \right) \right)^2}$$

NTM 3rd order : (totally flat only if $q = 0$; -3dB and $\Delta\phi = 90^\circ$ at f_c)

$$\text{Low_pass_NTM3} := \frac{1 + q \cdot k \cdot s + (k \cdot s)^2}{(1 + s) \cdot \left(1 + (1 - k^2) \cdot s + s^2 \right)}$$

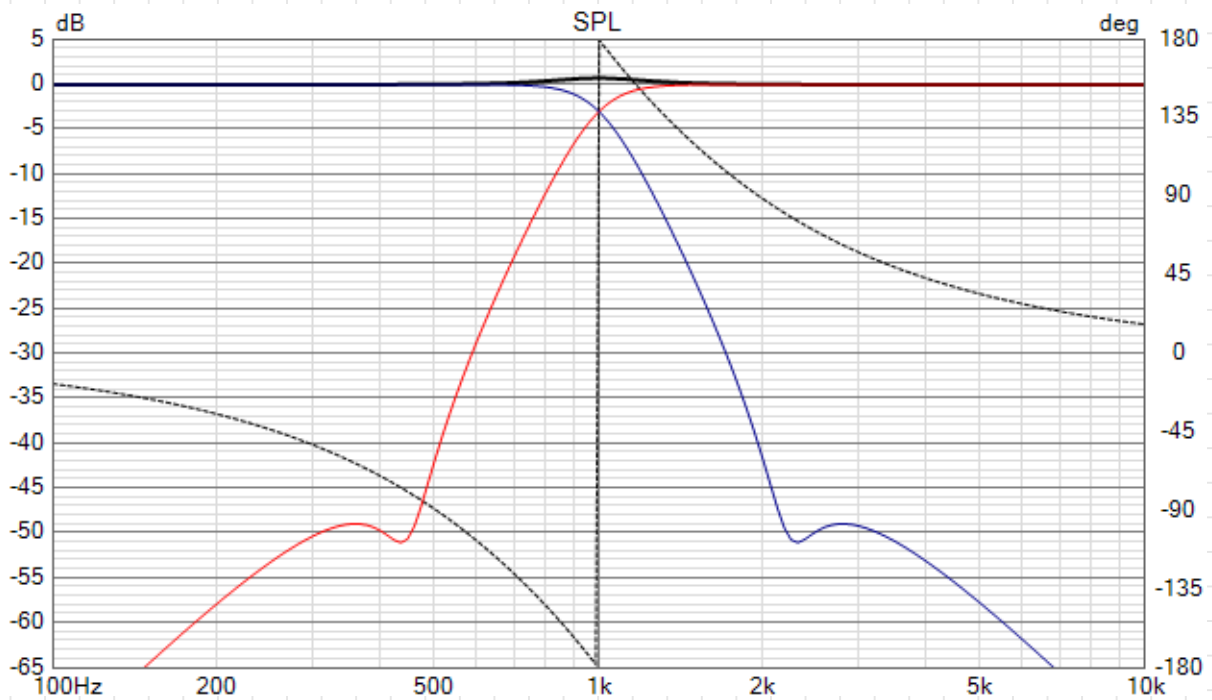
$$\text{High_pass_NTM3} := \frac{-(k^2 + q \cdot k \cdot s + s^2) \cdot s}{(1 + s) \cdot \left(1 + (1 - k^2) \cdot s + s^2 \right)}$$



NTM 5th order : (totally flat only if $q = 0$; -3dB and $\Delta\phi = 90^\circ$ at f_c)

$$\text{Low_pass_NTM5} := \frac{1 + q \cdot k \cdot s + (k \cdot s)^2}{(1 + s) \cdot \left(1 + \frac{-1 + \sqrt{5 - 4 \cdot k^2}}{2} \cdot s + s^2 \right) \cdot \left(1 + \frac{1 + \sqrt{5 - 4 \cdot k^2}}{2} \cdot s + s^2 \right)}$$

$$\text{High_pass_NTM5} := \frac{(k^2 + q \cdot k \cdot s + s^2) \cdot s^3}{(1 + s) \cdot \left(1 + \frac{-1 + \sqrt{5 - 4 \cdot k^2}}{2} \cdot s + s^2 \right) \cdot \left(1 + \frac{1 + \sqrt{5 - 4 \cdot k^2}}{2} \cdot s + s^2 \right)}$$



Reference : "Loudspeaker Crossovers with Notched Responses" by Neville Thiele, JAES Vol. 48, n° 9, 2000 September

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Python files on demand...