FM - Bessel

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OST Ostschweizer Fachhochschule

16.5.2022

Frequenzmodulation

$$\cos(\omega_c t + \beta \sin(\omega_m t)) \tag{1}$$

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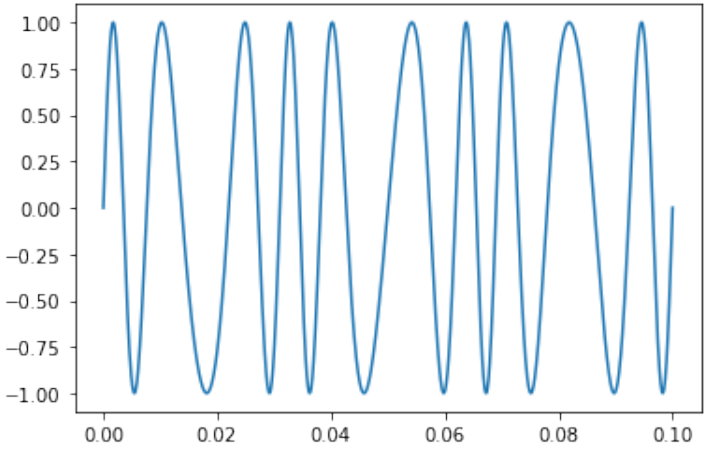

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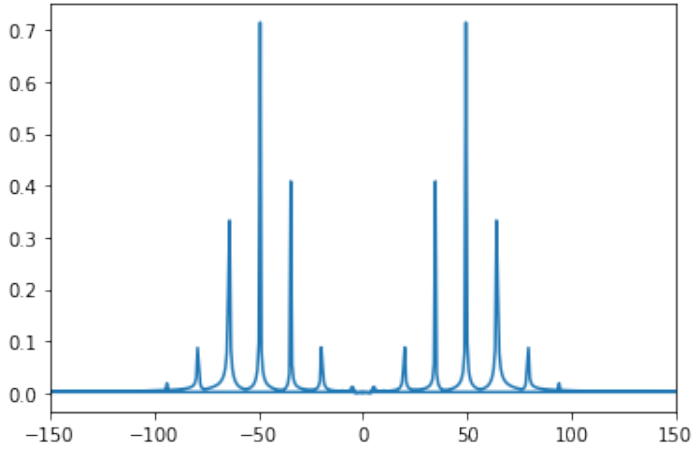

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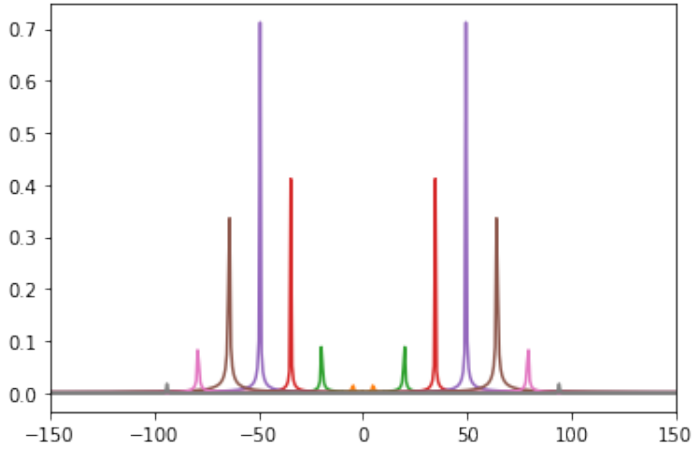

Bessel

$$\cos(\beta \sin \varphi) = J_0(\beta) + 2 \sum_{m=1}^{\infty} J_{2m}(\beta) \cos(2m\varphi) \tag{2}$$

$$\sin(\beta \sin \varphi) = J_0(\beta) + 2 \sum_{m=1}^{\infty} J_{2m}(\beta) \cos(2m\varphi) \tag{3}$$

$$J_{-n}(\beta) = (-1)^n J_n(\beta) \tag{4}$$

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$$\cos(A + B) = \cos(A)\cos(B) - \sin(A)\sin(B) \tag{5}$$

$$2\cos(A)\cos(B) = \cos(A - B) + \cos(A + B) \tag{6}$$

$$2\sin(A)\sin(B) = \cos(A - B) - \cos(A + B) \tag{7}$$

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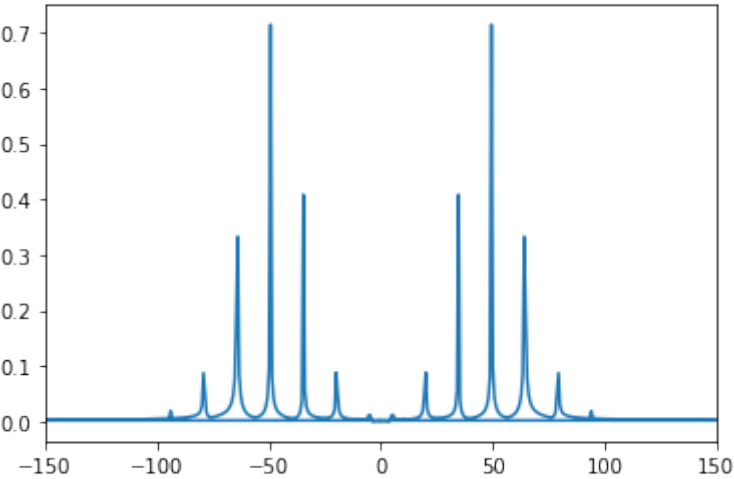
$$\cos(\omega_c t + \beta \sin(\omega_m t)) = \sum_{k=-\infty}^{\infty} J_k(\beta) \cos((\omega_c + k\omega_m)t) \tag{8}$$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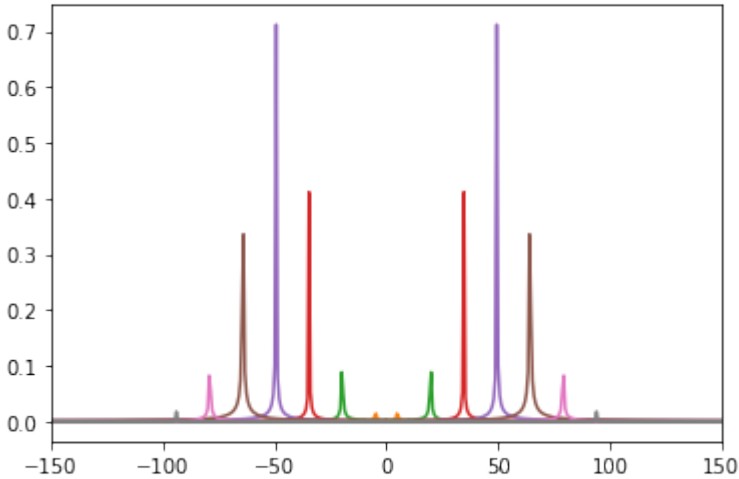
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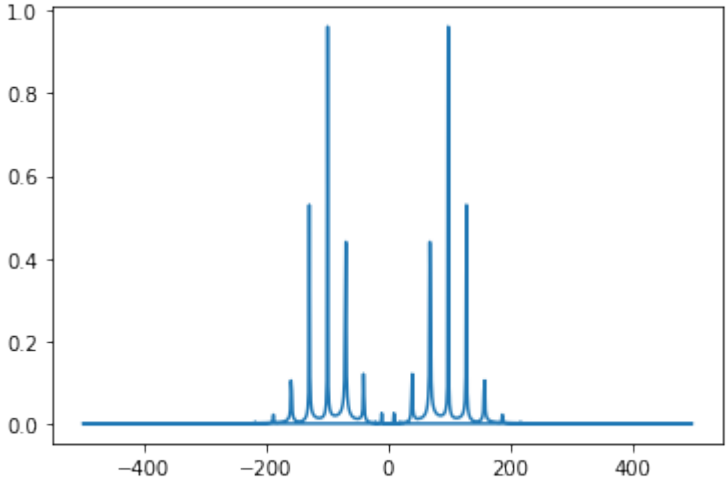
Träger-Frequenz Parameter

$$\cos(\omega_c t + \beta \sin(\omega_m t)) \tag{9}$$



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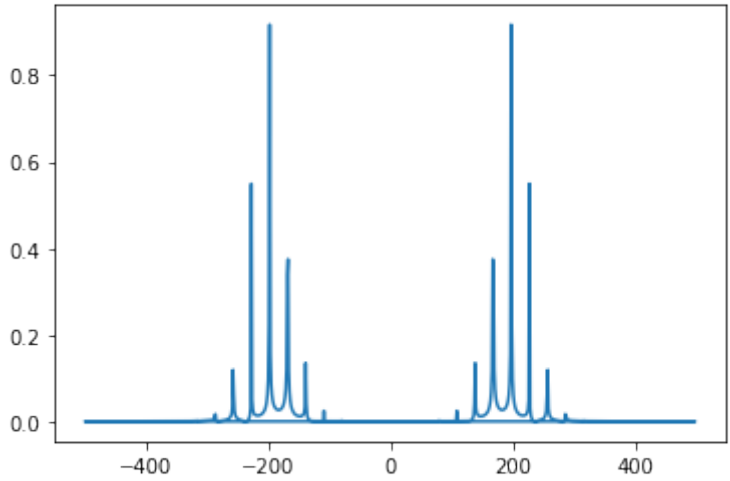

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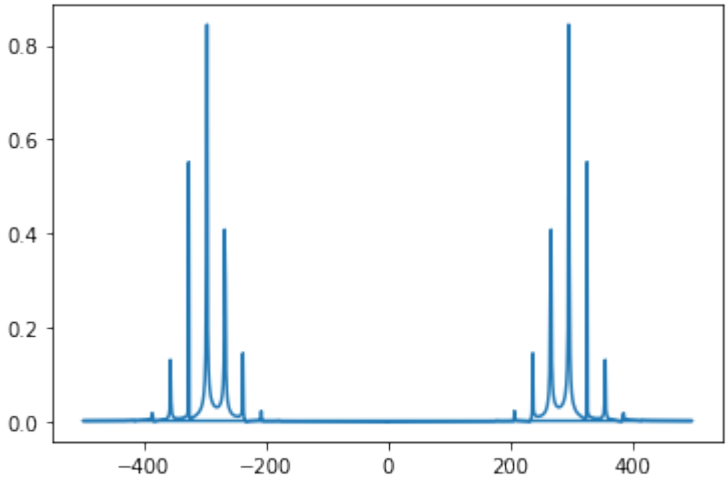

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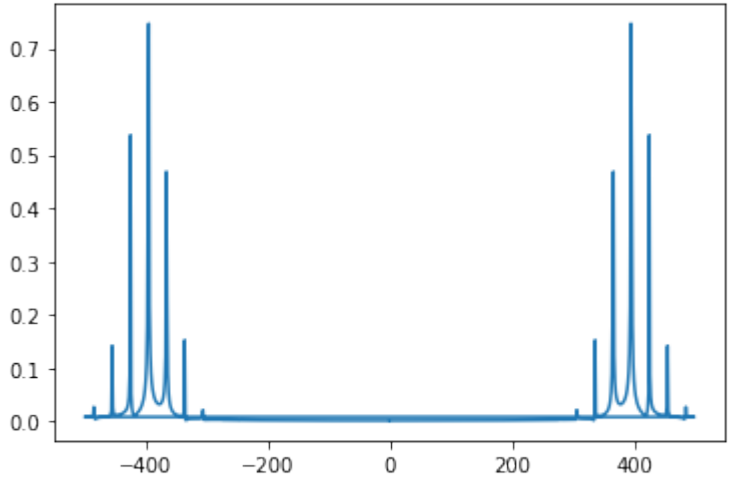

Modulations-Frequenz Parameter

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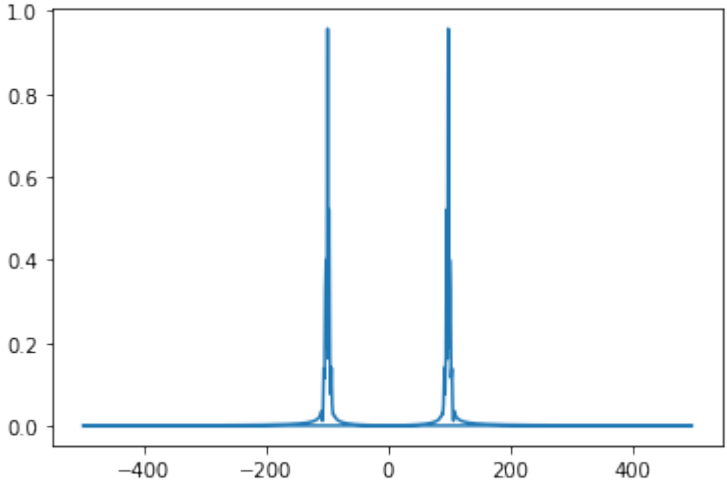

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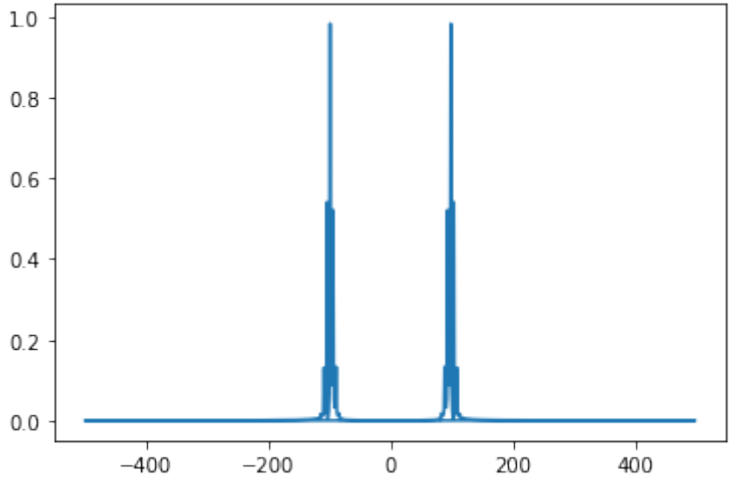

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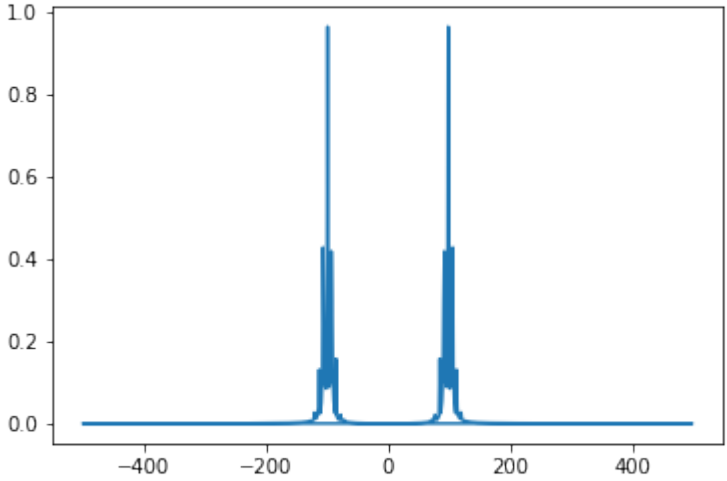

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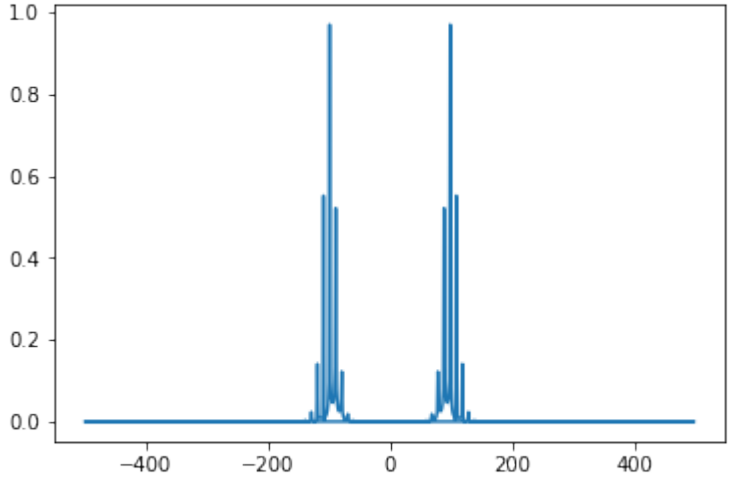

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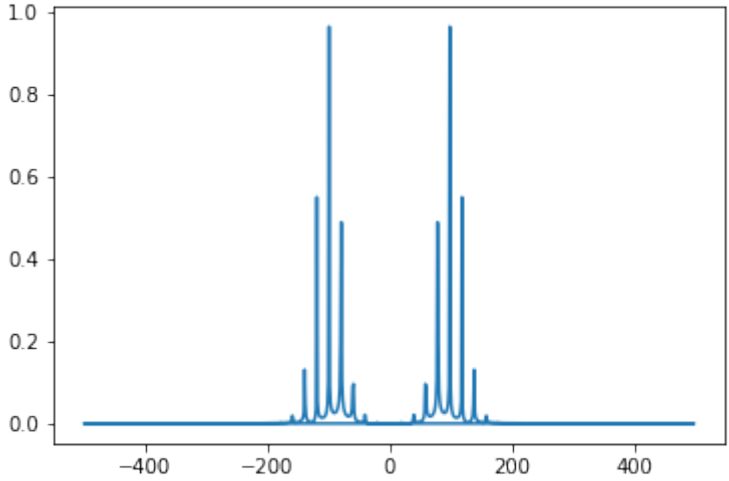

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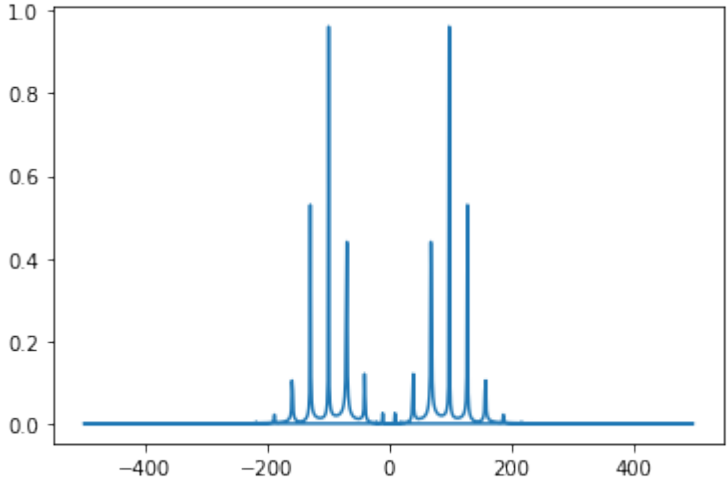
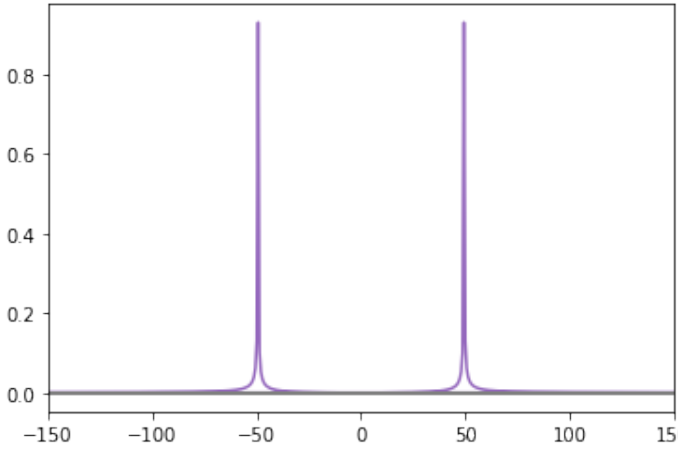


Beta Parameter

$$\sum_{k=-\infty}^{\infty} J_k(\beta)\cos((\omega_c + k\omega_m)t) \tag{11}$$



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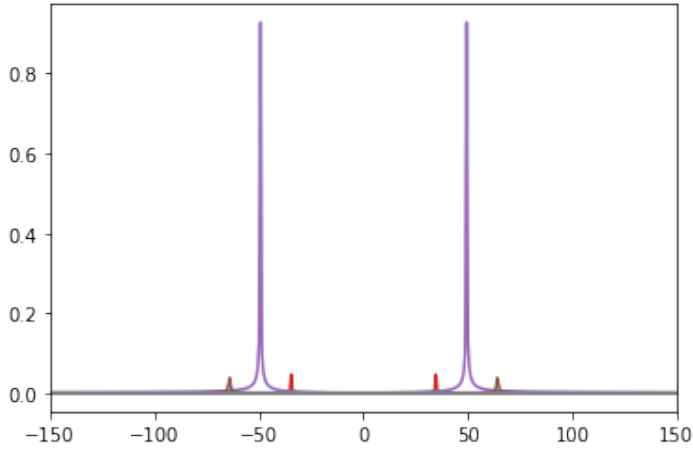

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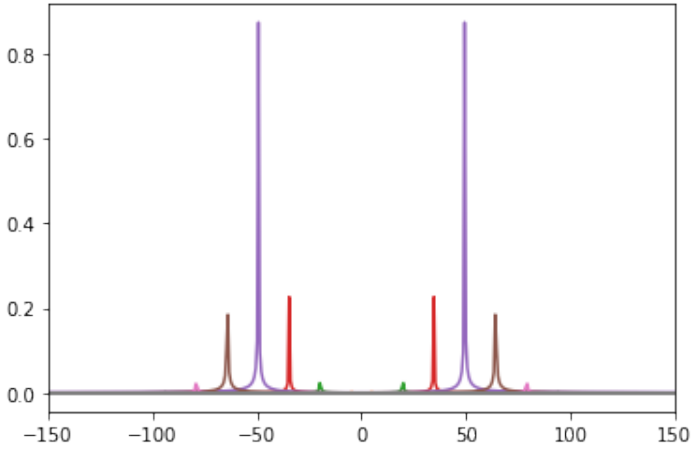

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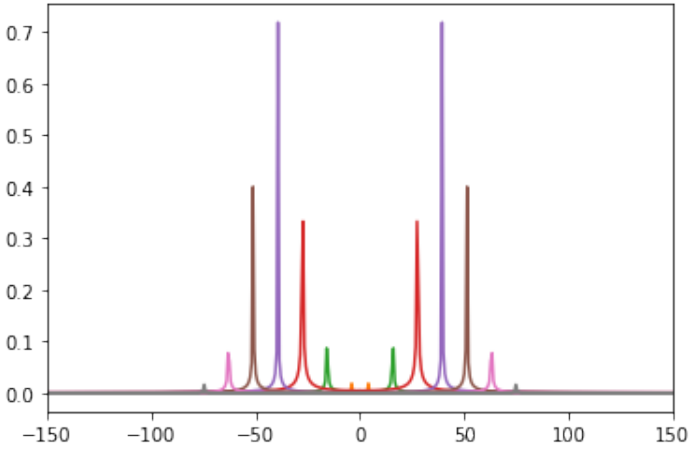

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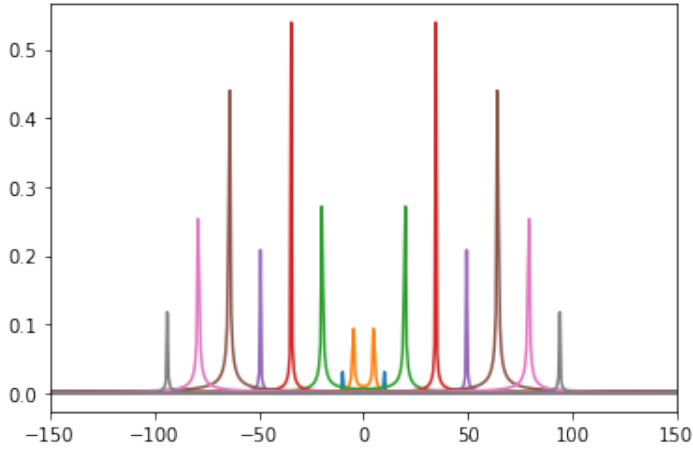

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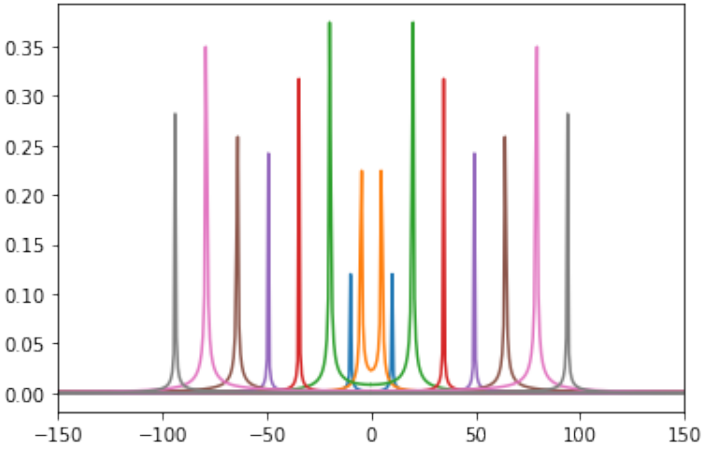

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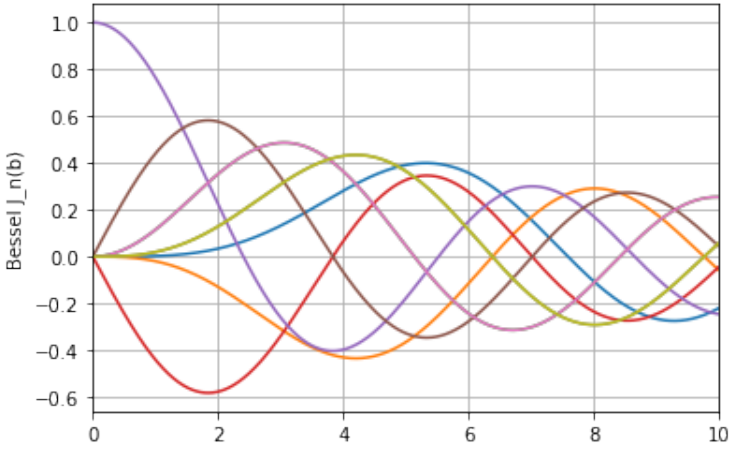

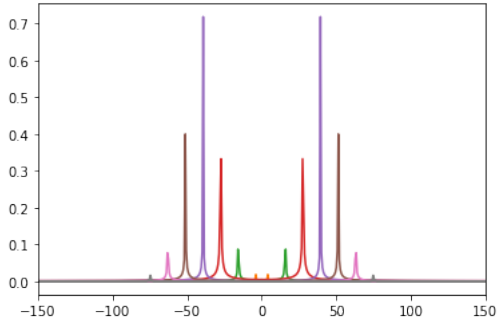
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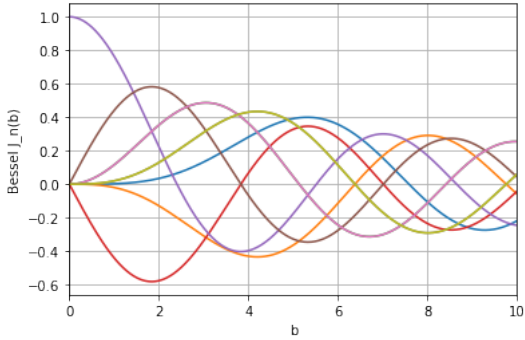
Bessel J_n(b)
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0.2
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−0.4
−0.6
0
2
4
6
8
10
b