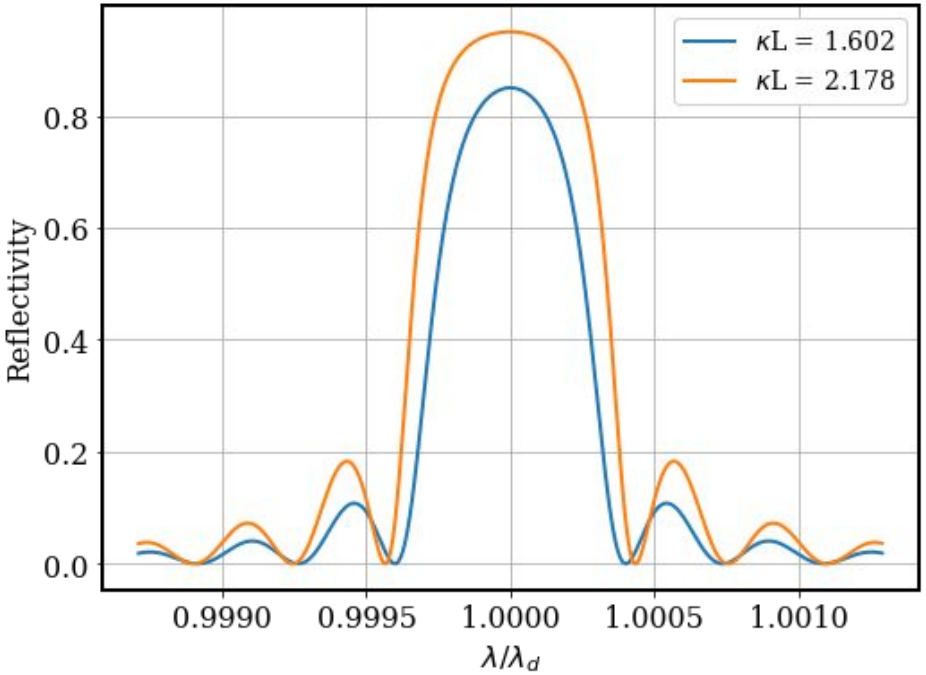
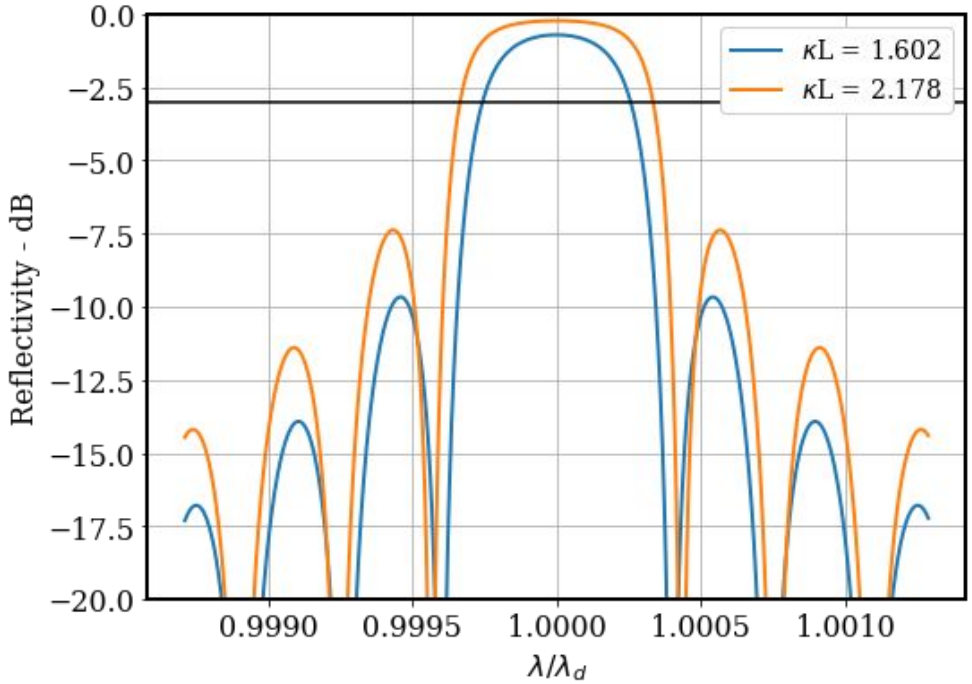
BRAGG GRATING

Moisés de Araújo Oliveira





L = 1.5 mm

rmax_1 = 0.85

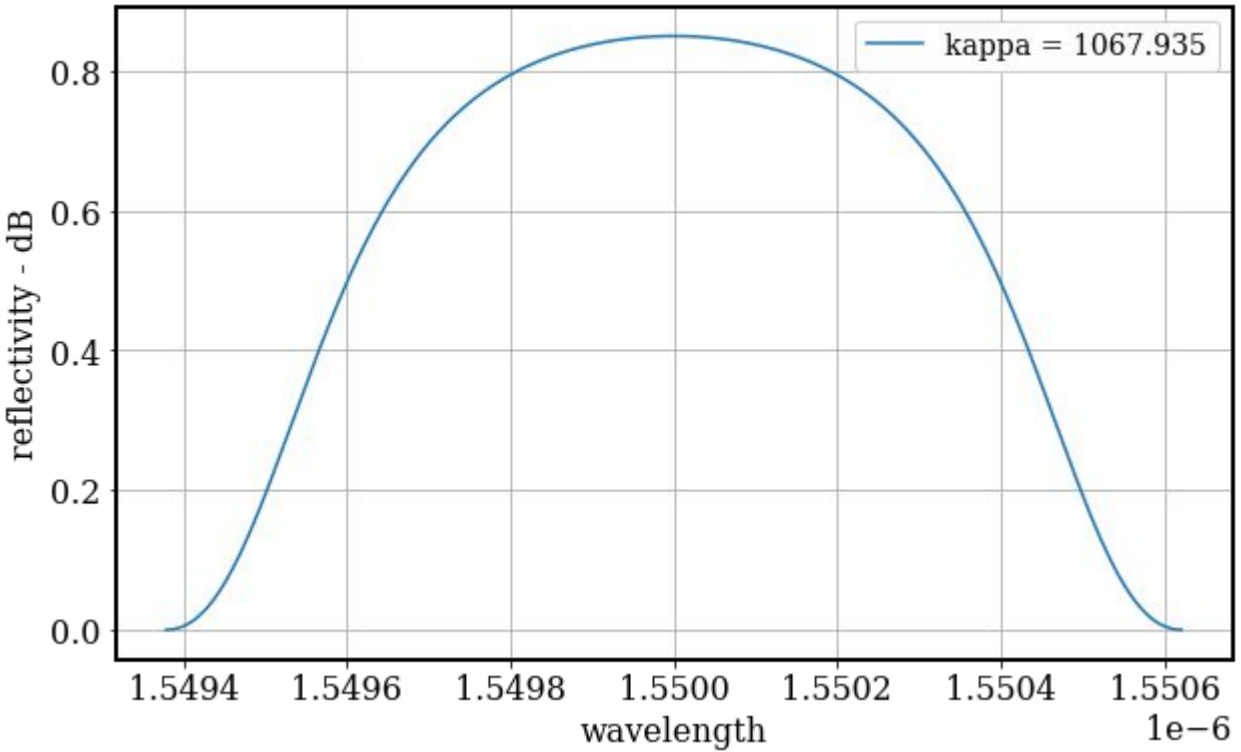
rmax_2 = 0.95

Bandedge

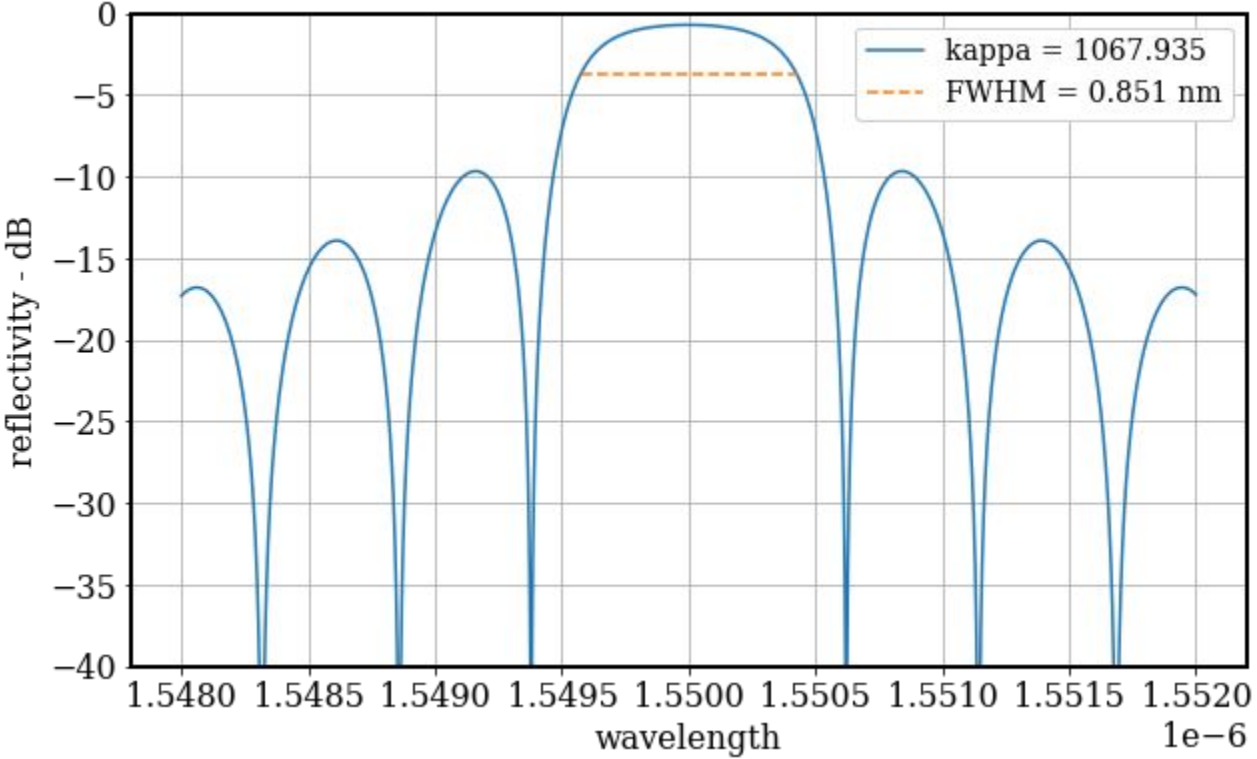
$$\lambda_{\text{band edge}} = \lambda_{\max} \pm \frac{v\overline{\delta n}_{\text{eff}}}{2n_{\text{eff}}} \lambda_D.$$

$$\frac{\Delta\lambda_{\text{band edge}}}{\lambda} = \frac{v\overline{\delta n}_{\text{eff}}}{n_{\text{eff}}}$$

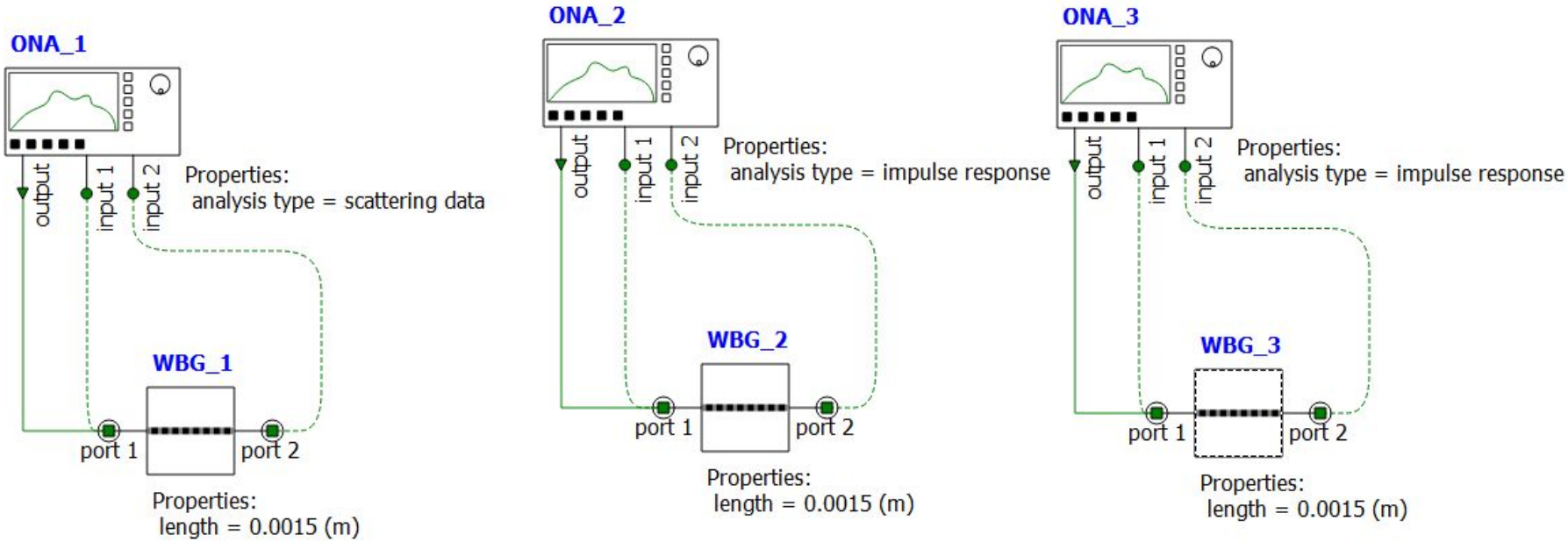
Band between the first zeros

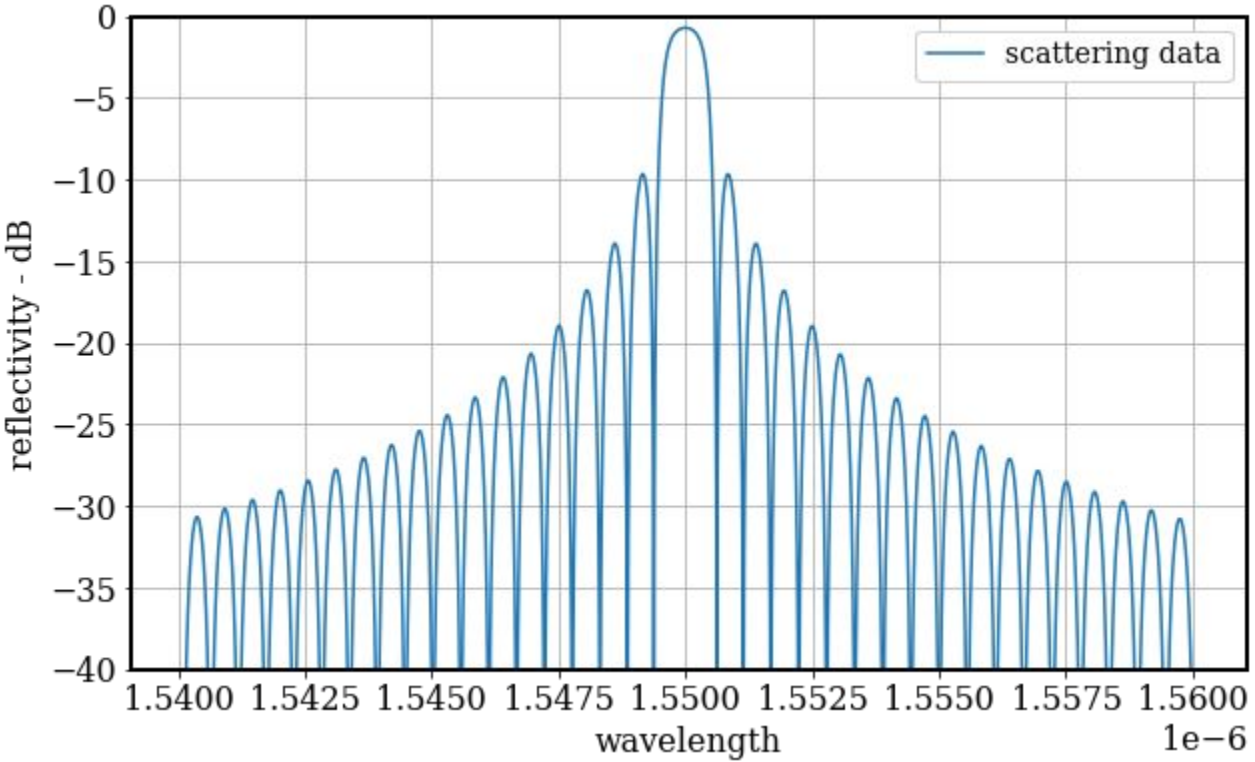


FWHM


kappa = 1067.935
FWHM = 0.851 nm
reflectivity - dB
0
−5
−10
−15
−20
−25
−30
−35
−40
1.5480
1.5485
1.5490
1.5495
1.5500
1.5505
1.5510
1.5515
1.5520
wavelength
1e−6

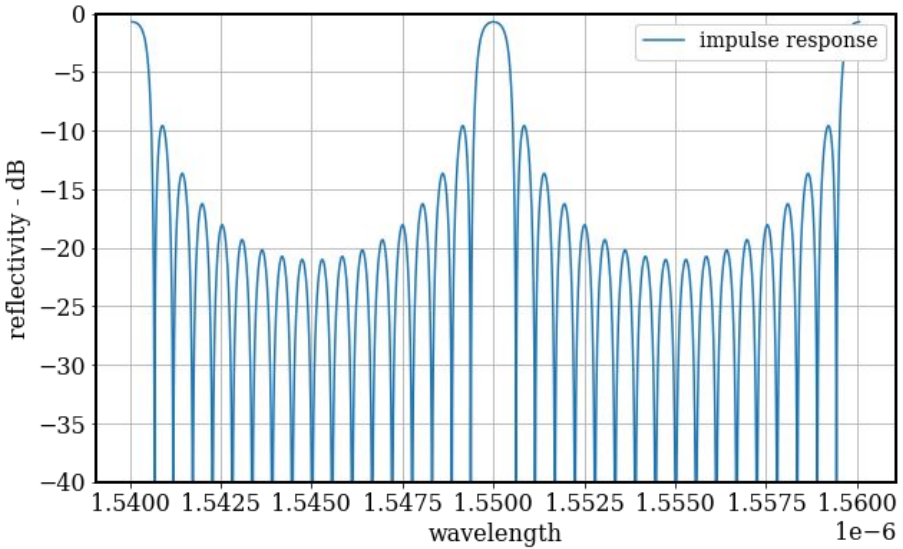
Interconnect





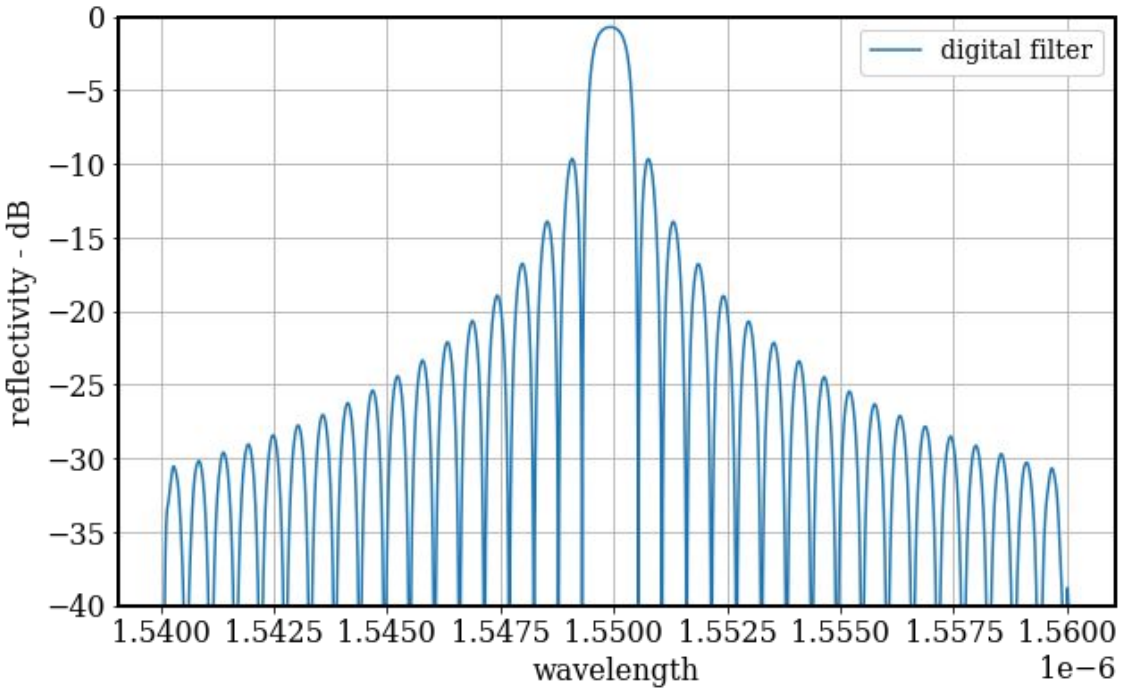
L = 1.5 mm

Effective index AC change = 0.000526898



Impulse response = True

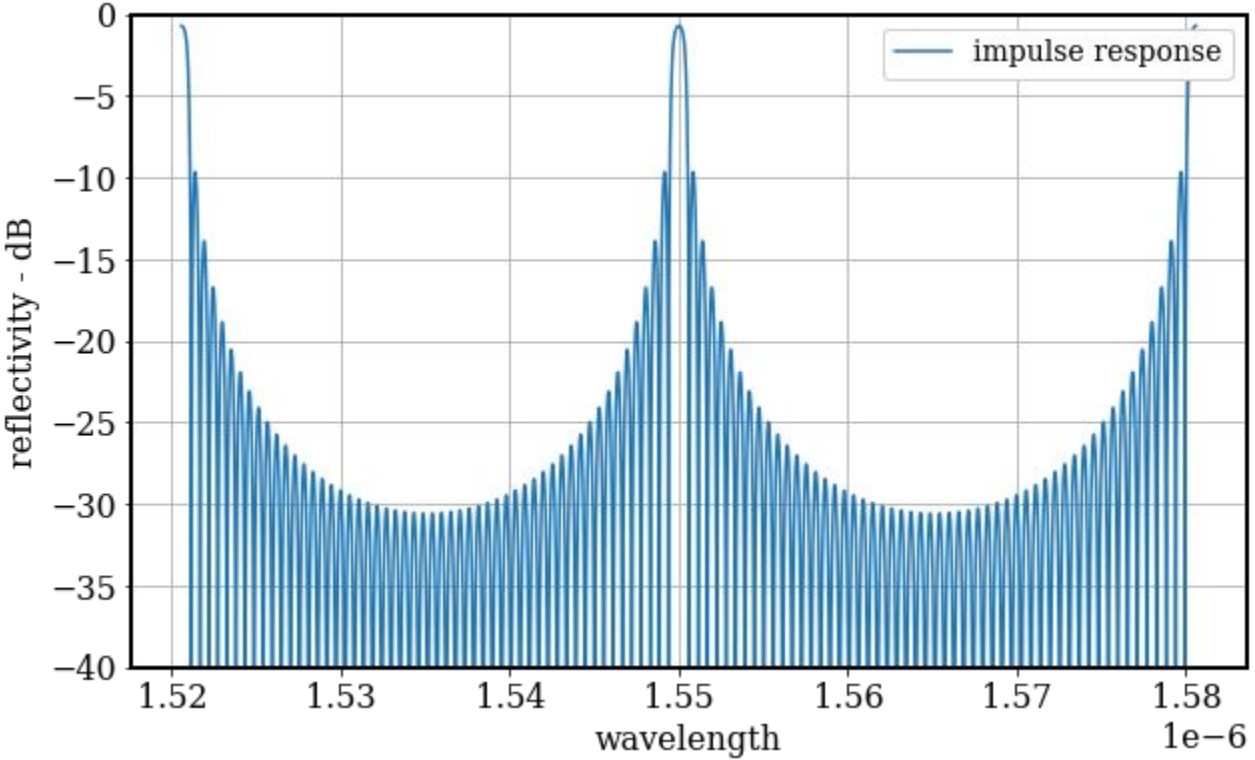
digital filter = False

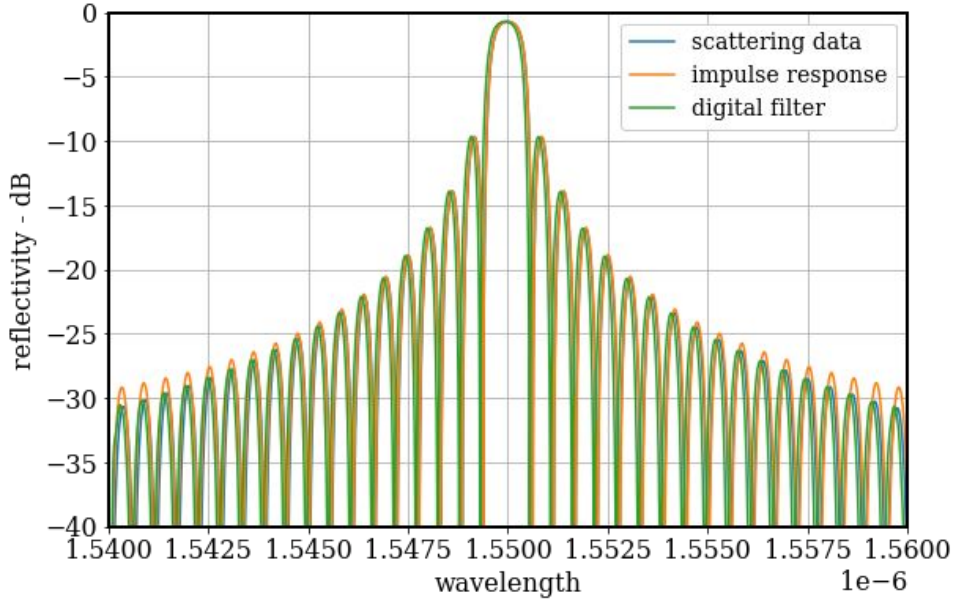


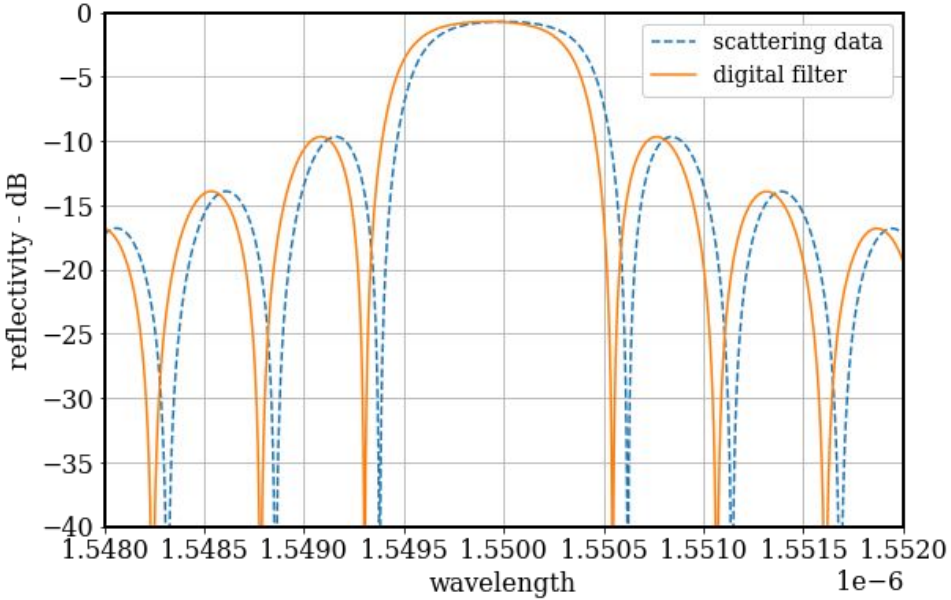
Impulse response = True

Digital Filter = True

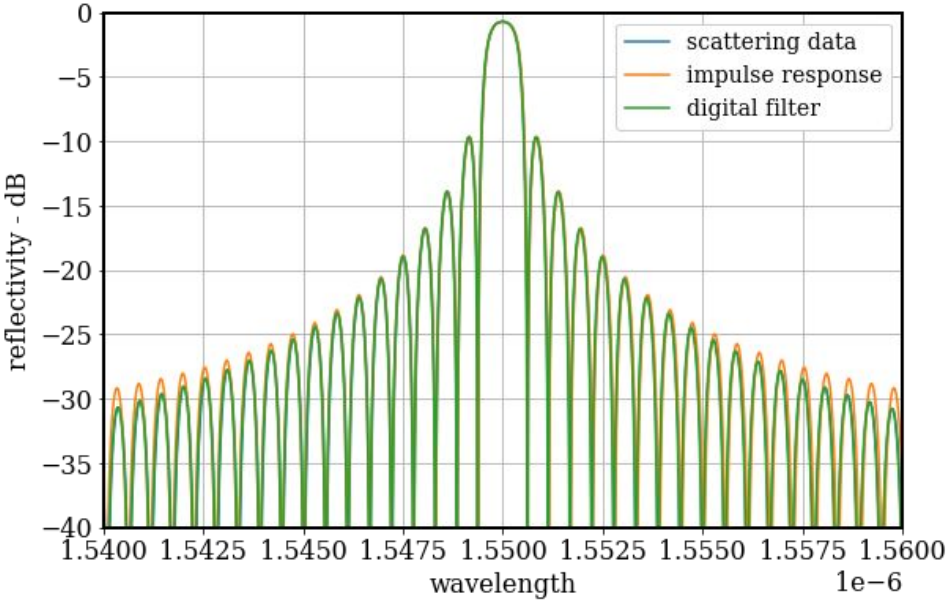
Increasing the bandwidth of the Impulse response to 60nm

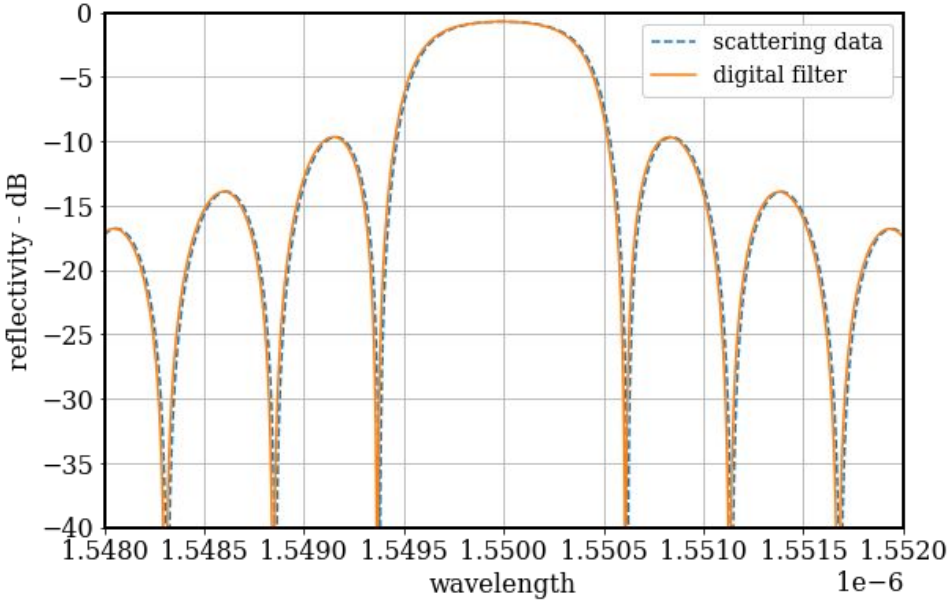



scattering data
impulse response
digital filter
reflectivity - dB
wavelength
1e−6

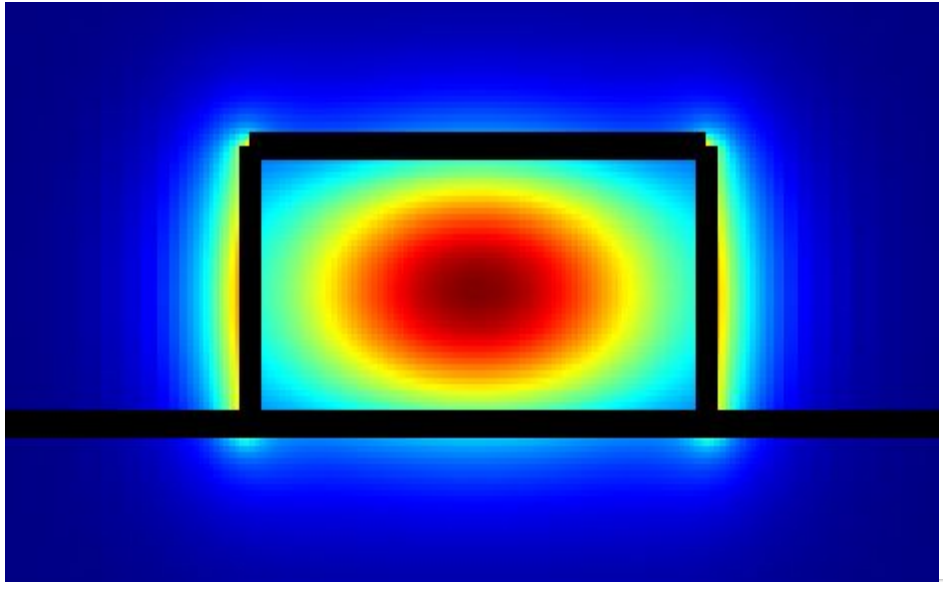

scattering data
digital filter
reflectivity - dB
wavelength
1e−6

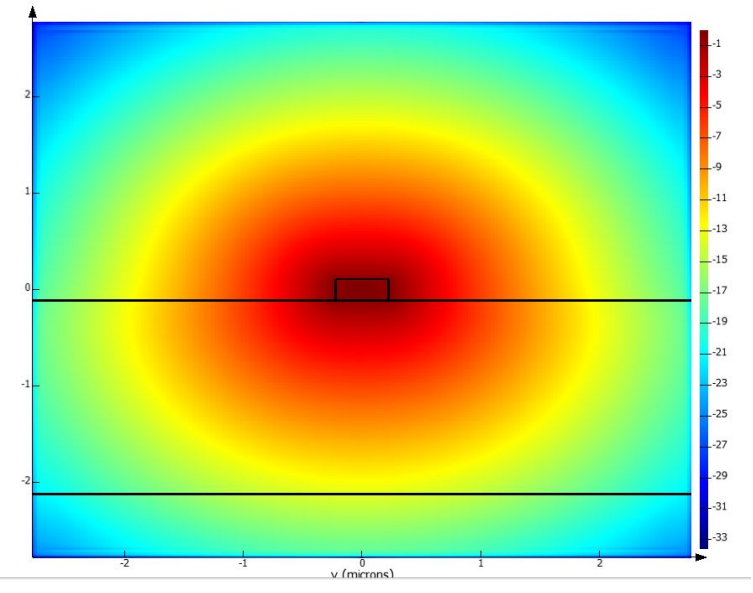
Increasing the filter order



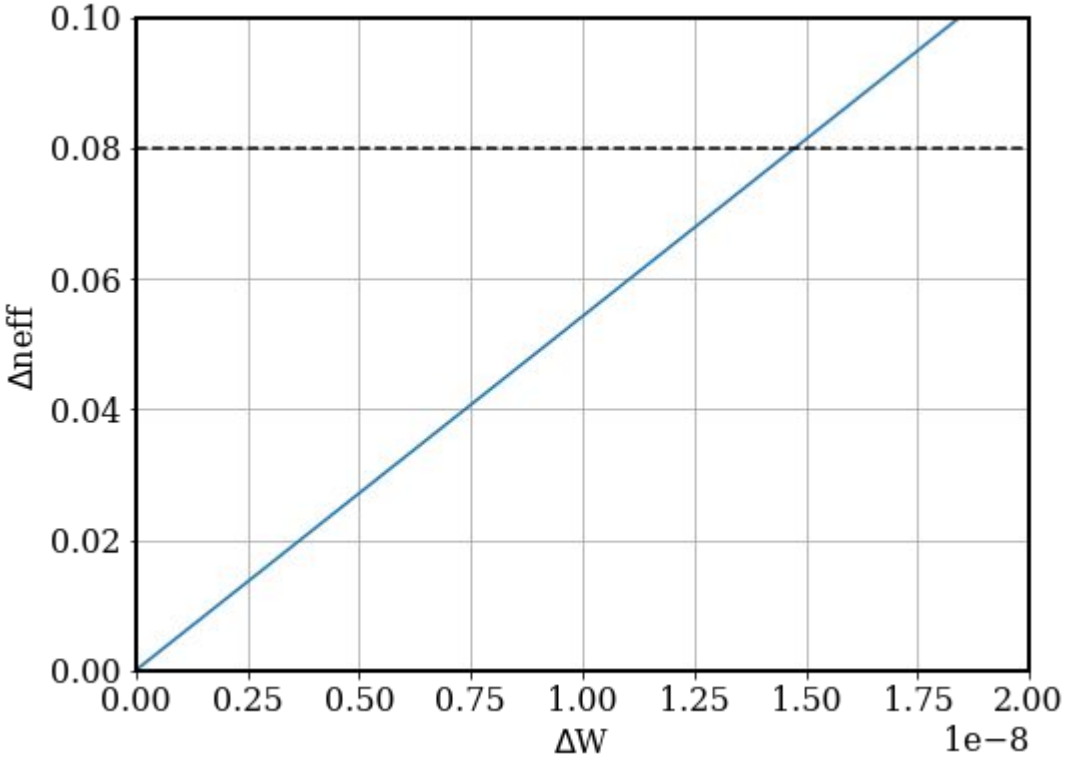


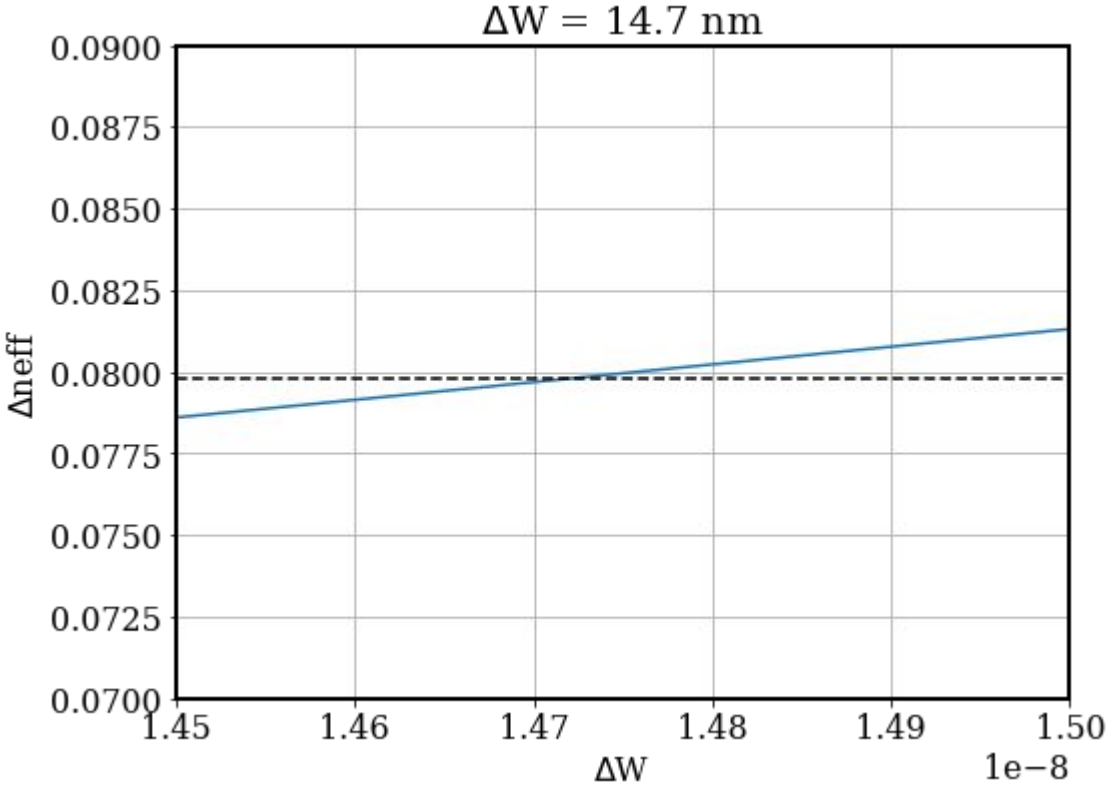
Device



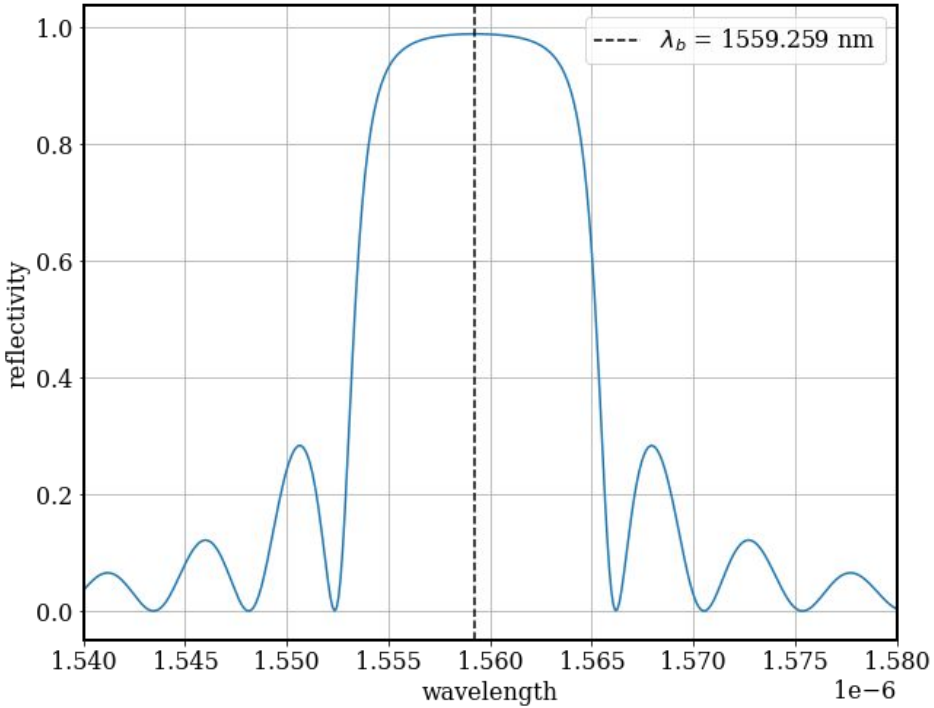


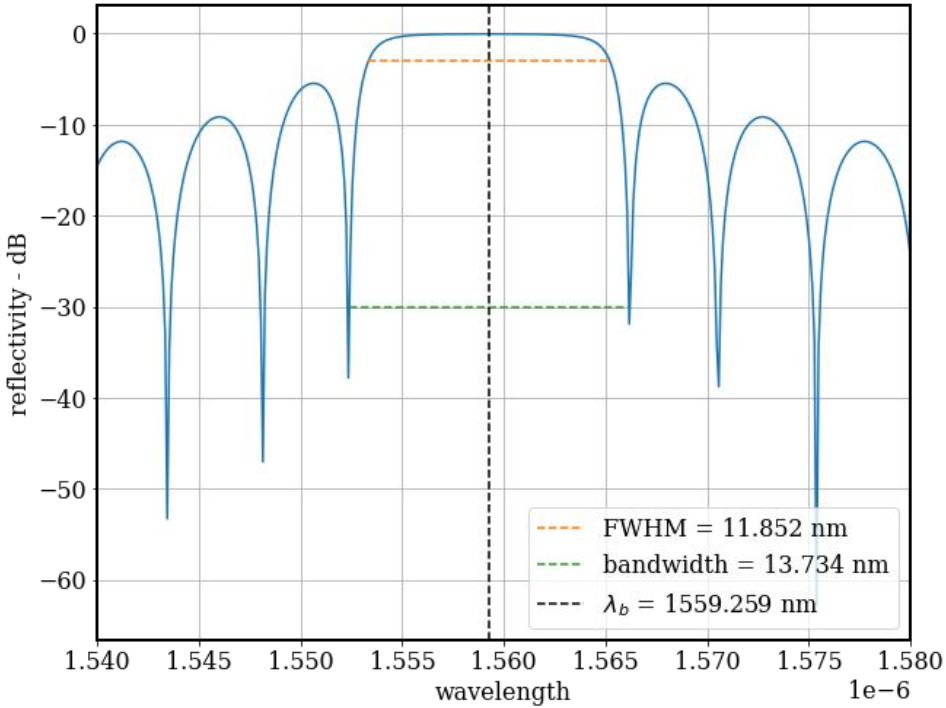
mode #	effective index	wavelength (μm)	loss (dB/cm)	group index	TE polarization fraction (Ey)	waveguide TE/TM fraction (%)	effective area (μm^2)
1	2.257533+1.600058e-16i	1.56	5.5976e-11	4.606854-2.747917e-17i	97	68.02 / 81.9	0.197562

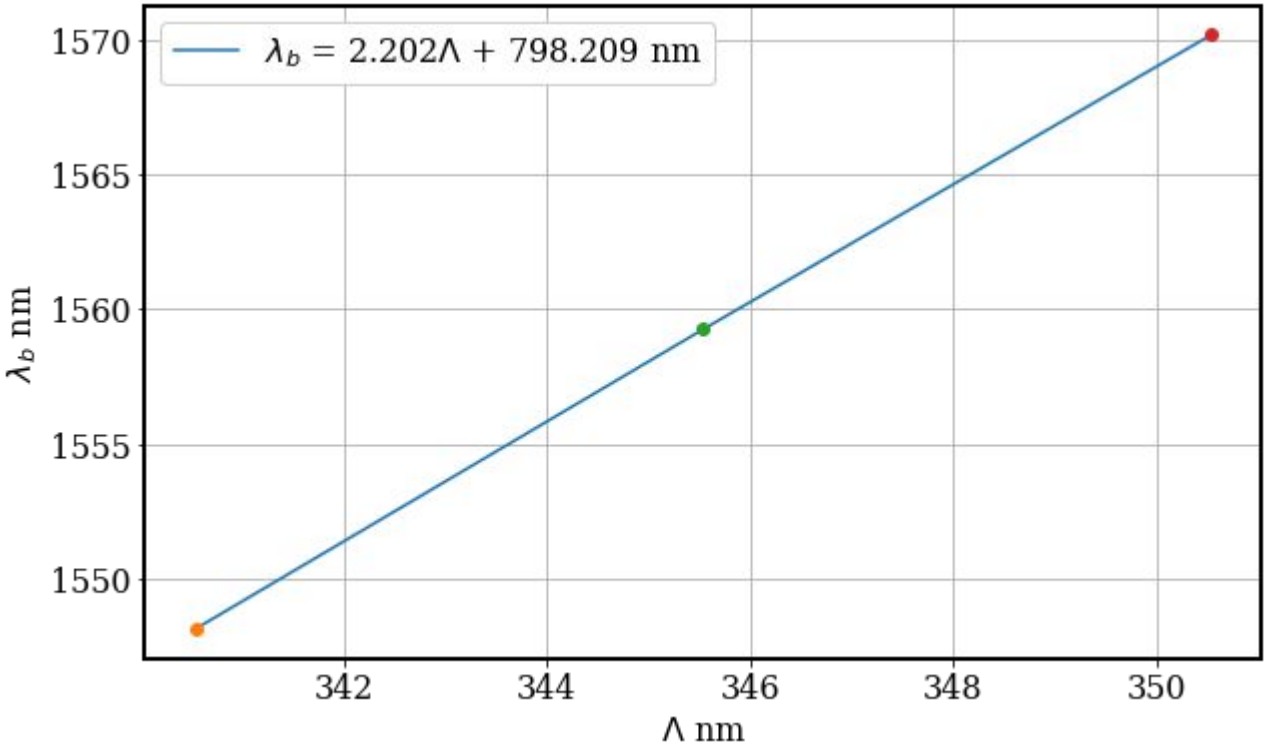

0.10
0.08
0.06
0.04
0.02
0.00
Δneff
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
ΔW
1e−8

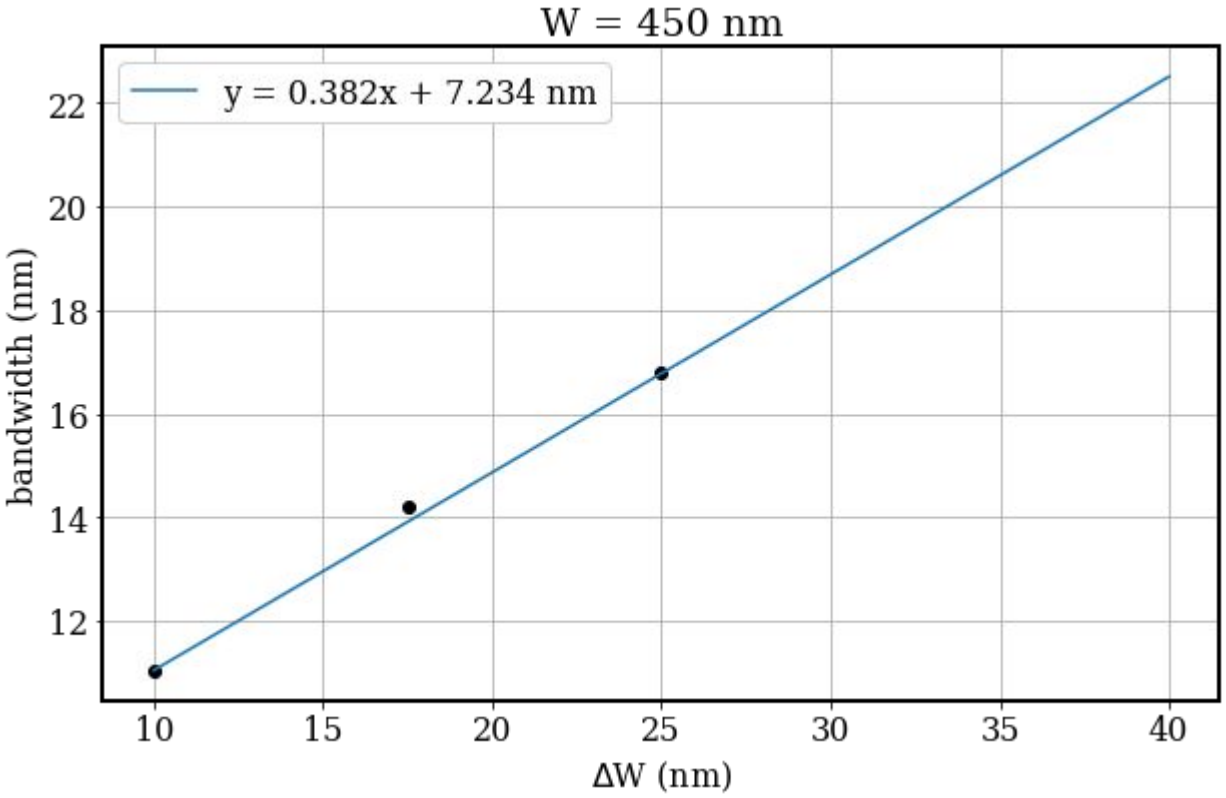

ΔW = 14.7 nm
0.0900
0.0875
0.0850
0.0825
0.0800
0.0775
0.0750
0.0725
0.0700
Δneff
1.45
1.46
1.47
1.48
1.49
1.50
ΔW
1e−8

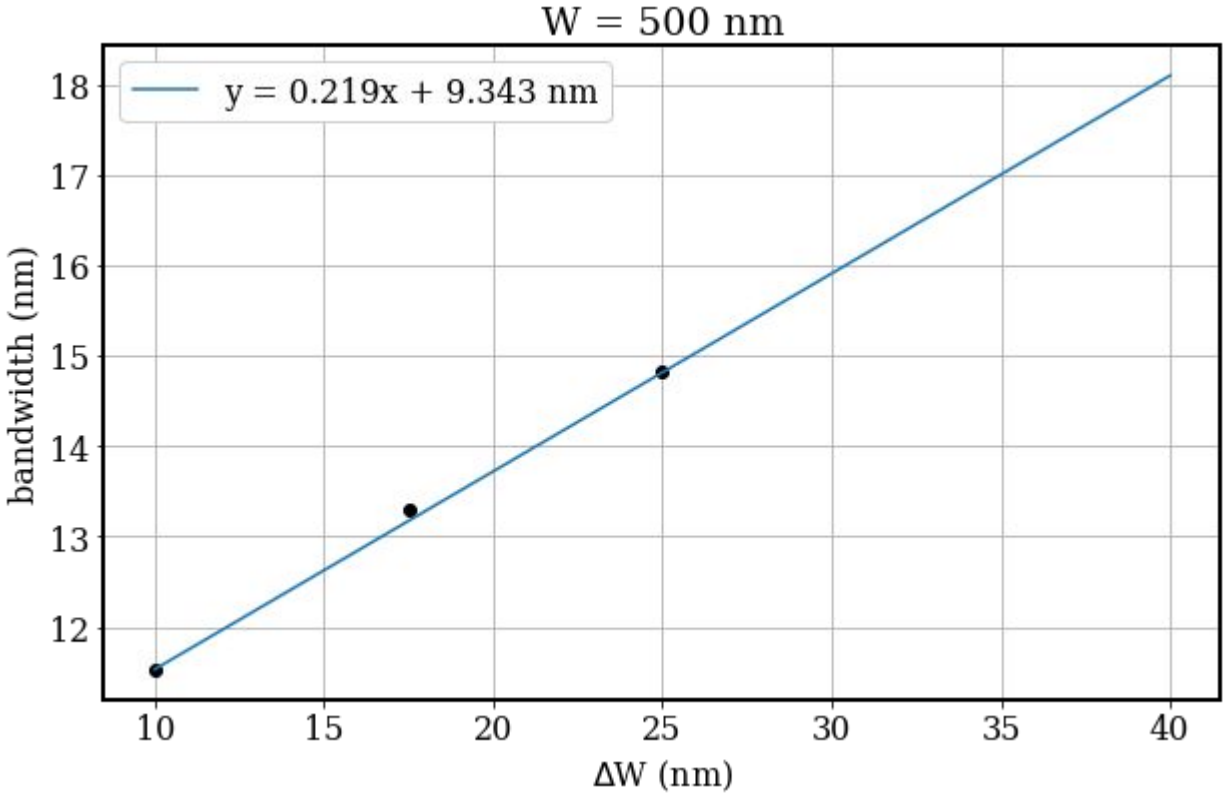
EME SIMULATION

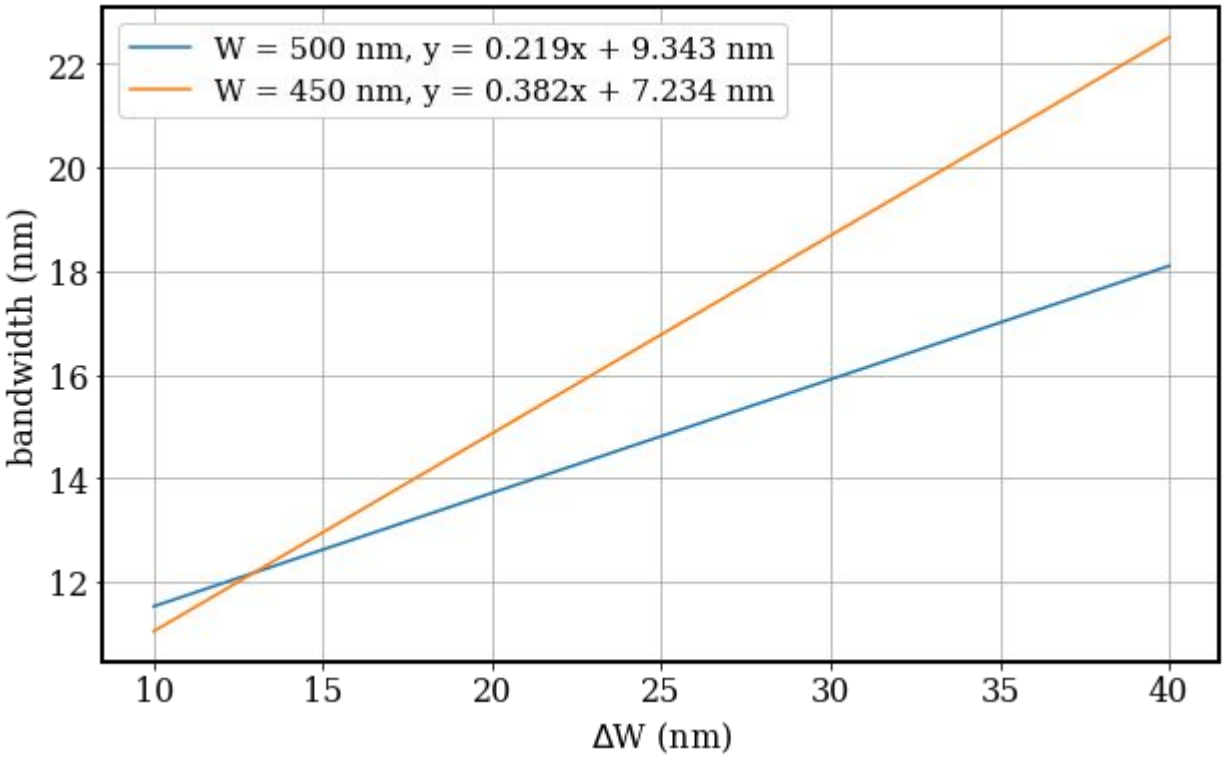


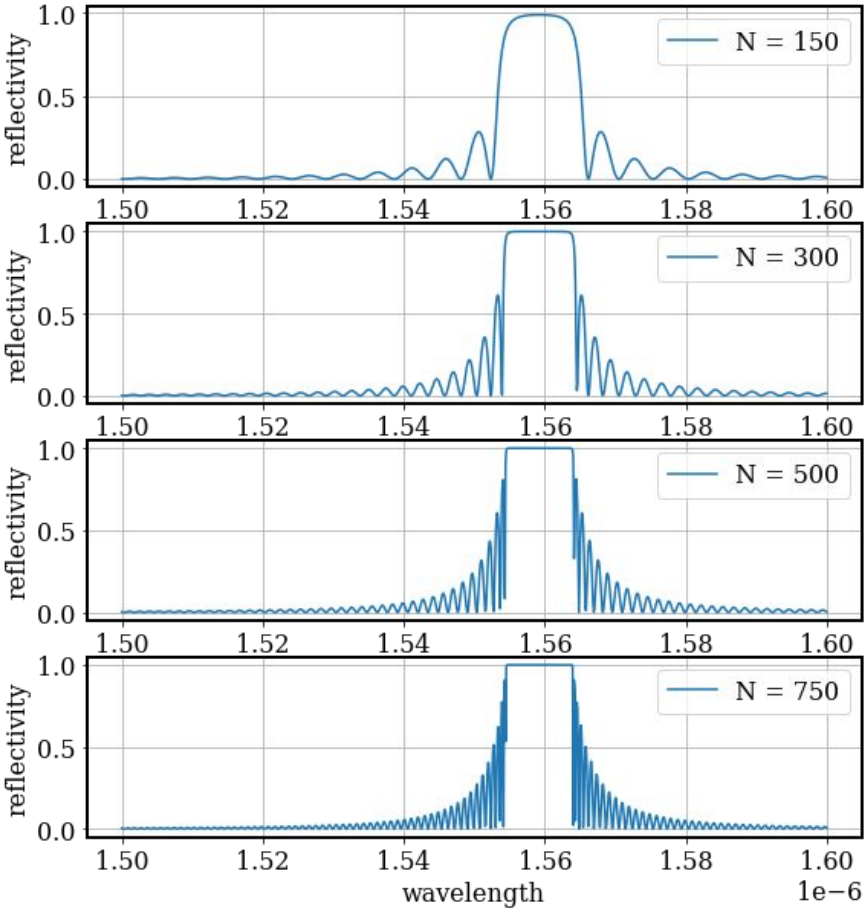


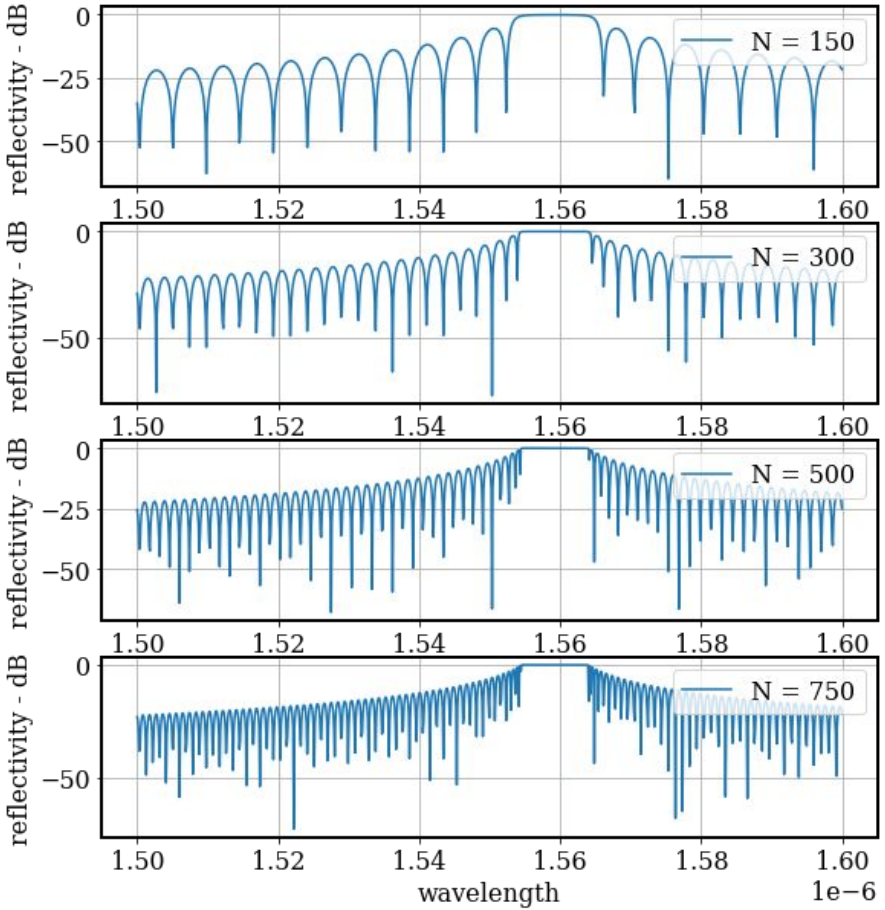

$\lambda_b = 2.202\Lambda + 798.209$ nm
1570
1565
1560
1555
1550
λ_b nm
342
344
346
348
350
Λ nm


W = 450 nm
y = 0.382x + 7.234 nm
bandwidth (nm)
ΔW (nm)
12
14
16
18
20
22
10
15
20
25
30
35
40

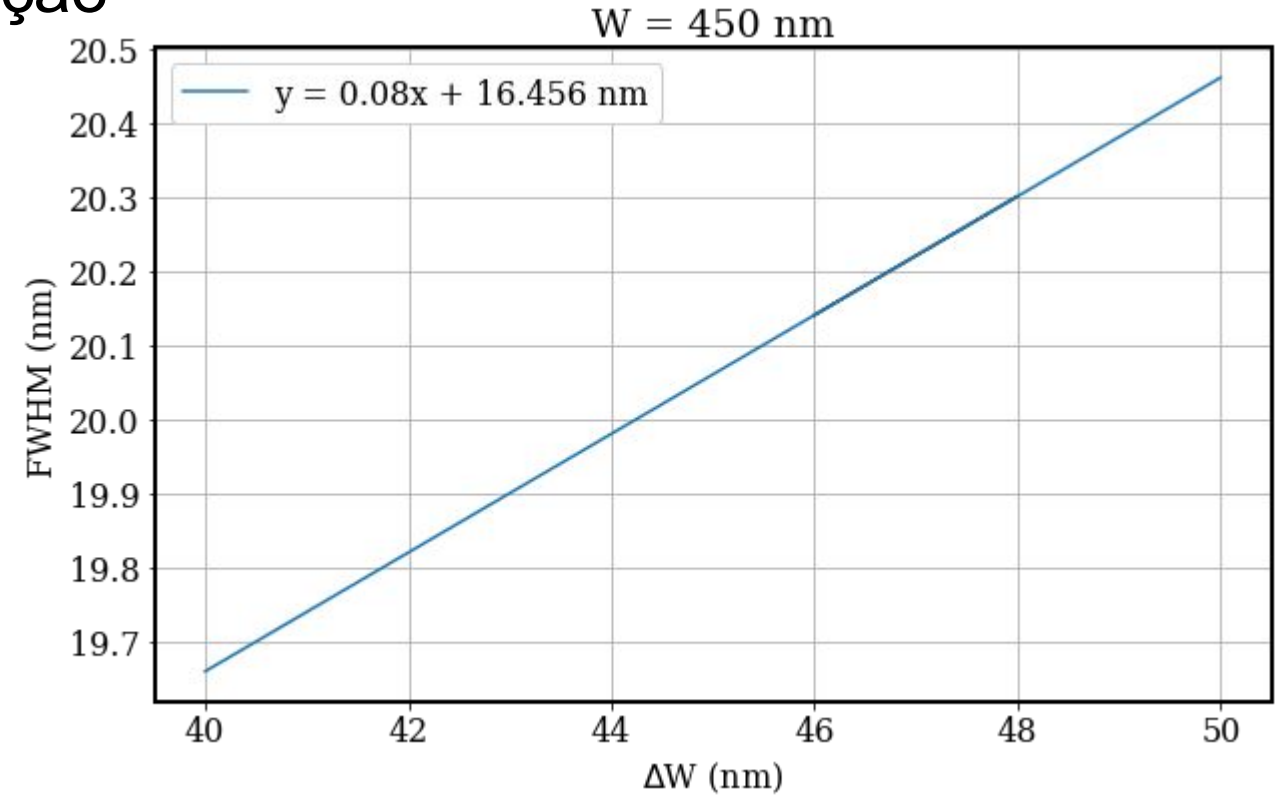

W = 500 nm
y = 0.219x + 9.343 nm
bandwidth (nm)
ΔW (nm)
18
17
16
15
14
13
12
10
15
20
25
30
35
40

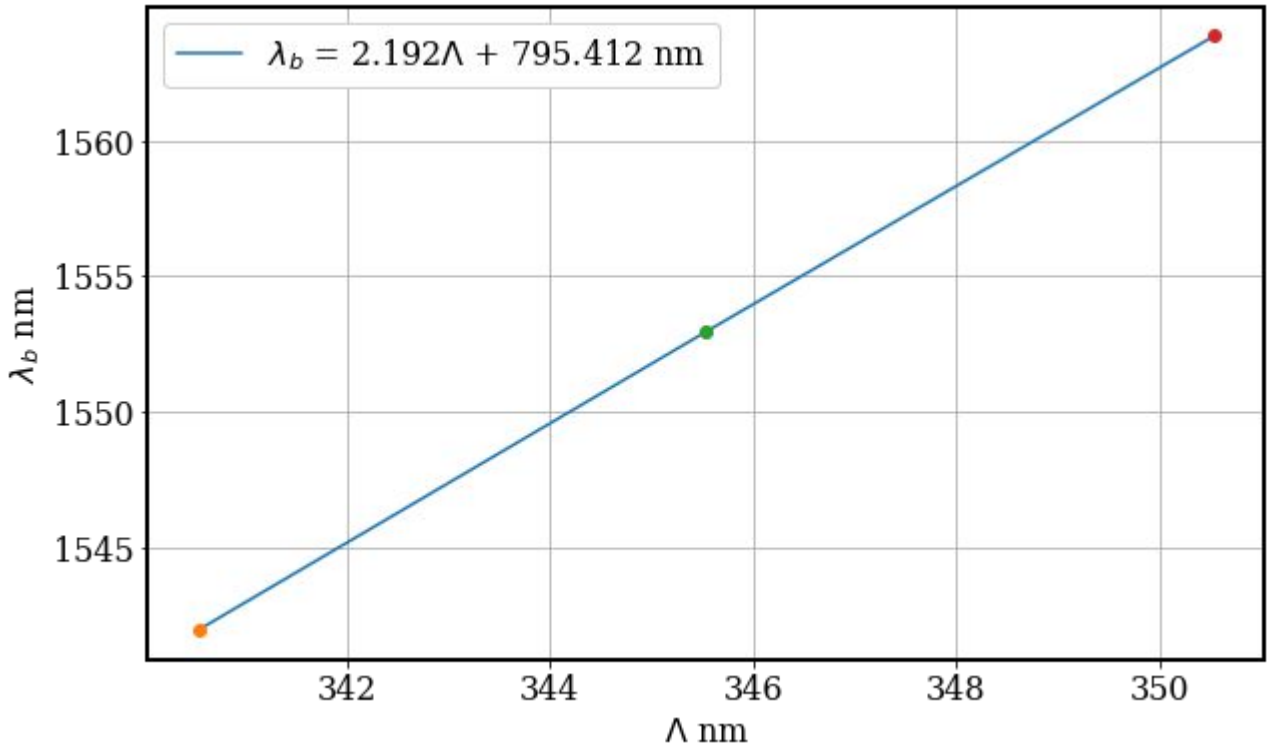

W = 500 nm, y = 0.219x + 9.343 nm
W = 450 nm, y = 0.382x + 7.234 nm
bandwidth (nm)
ΔW (nm)
12
14
16
18
20
22
10
15
20
25
30
35
40

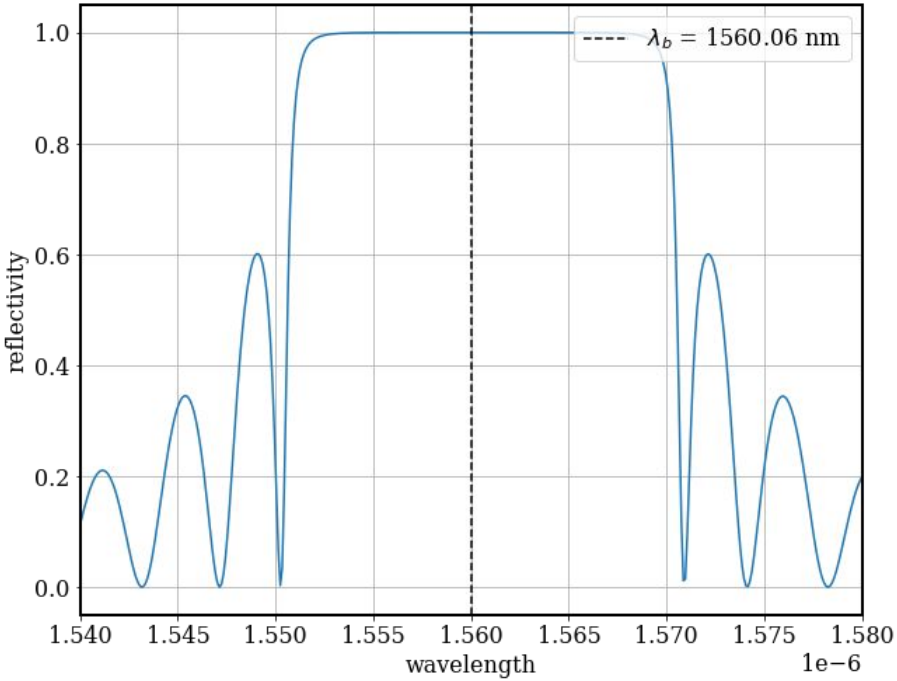

reflectivity
N = 150
N = 300
N = 500
N = 750
1.0
0.5
0.0
1.50
1.52
1.54
1.56
1.58
1.60
wavelength
1e−6

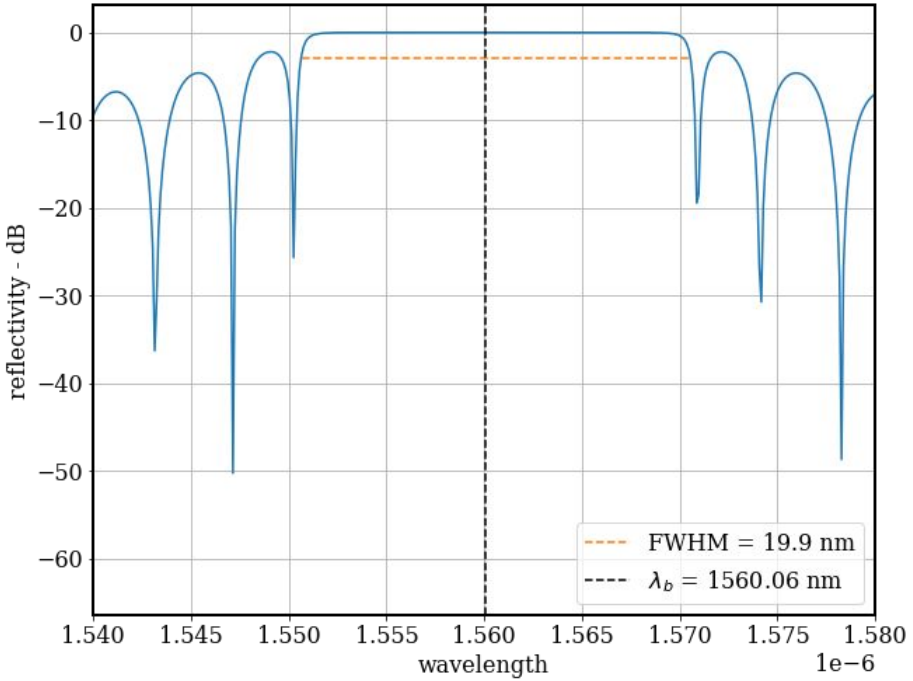

reflectivity - dB
N = 150
N = 300
N = 500
N = 750
0
−25
−50
1.50
1.52
1.54
1.56
1.58
1.60
wavelength
1e−6

Otimização


W = 450 nm
y = 0.08x + 16.456 nm
FWHM (nm)
20.5
20.4
20.3
20.2
20.1
20.0
19.9
19.8
19.7
40
42
44
46
48
50
ΔW (nm)


$\lambda_b = 2.192\Lambda + 795.412$ nm
1560
1555
1550
1545
λ_b nm
342
344
346
348
350
Λ nm

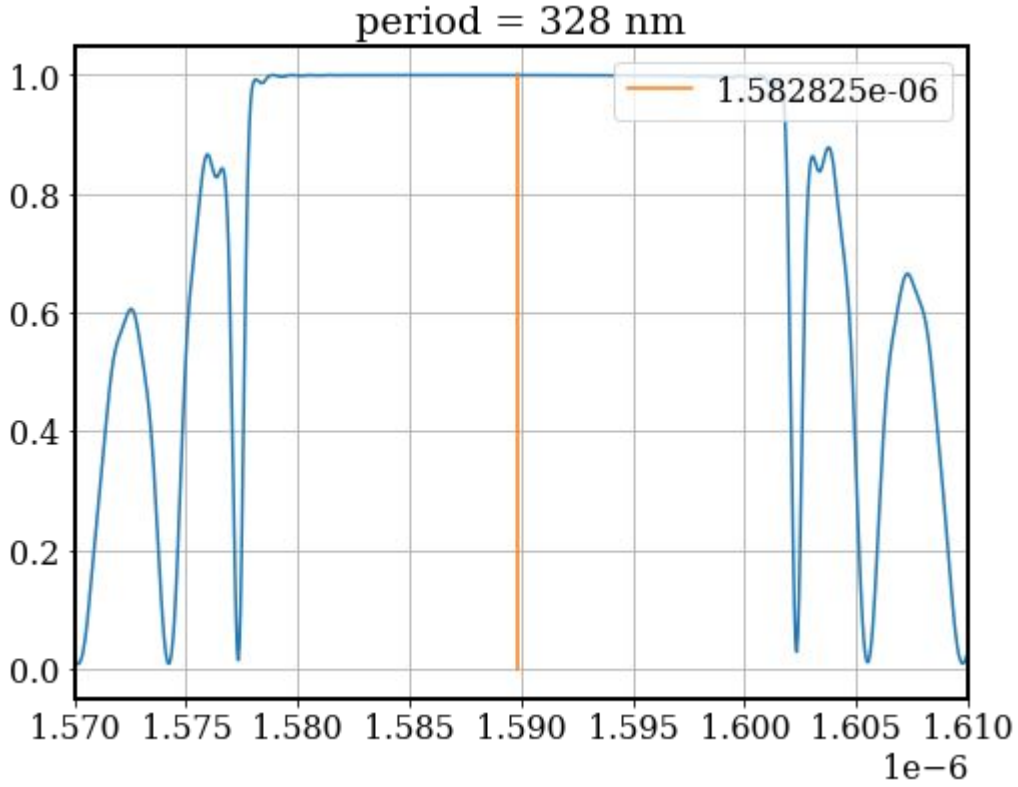


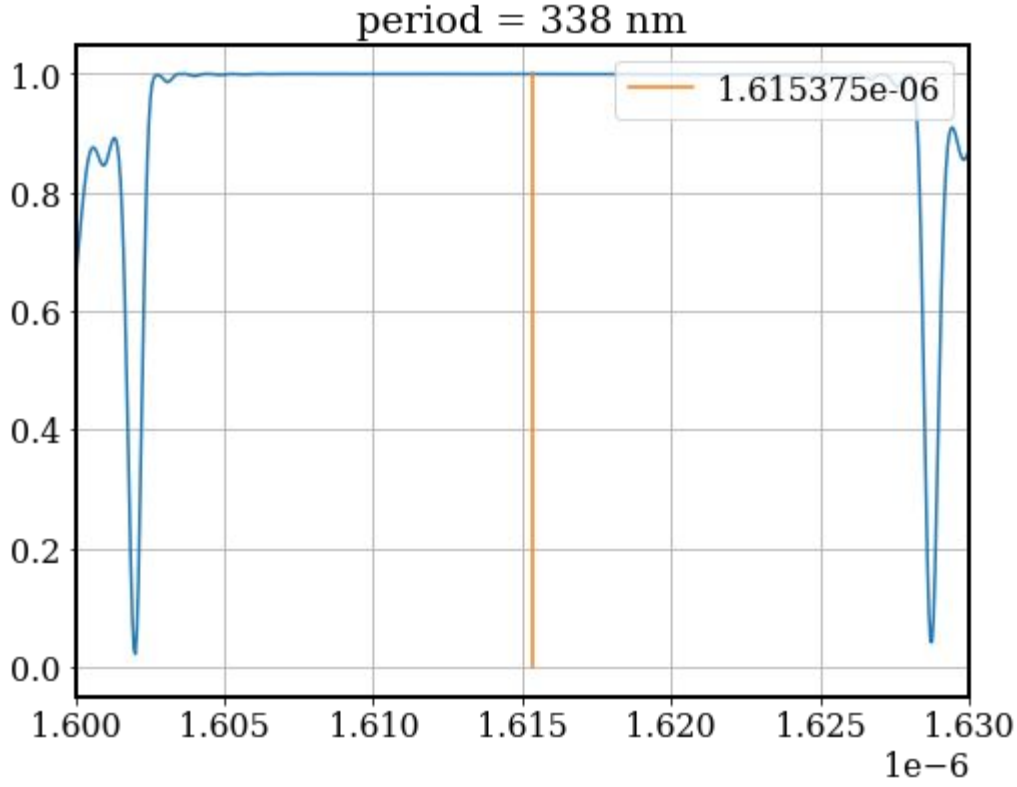


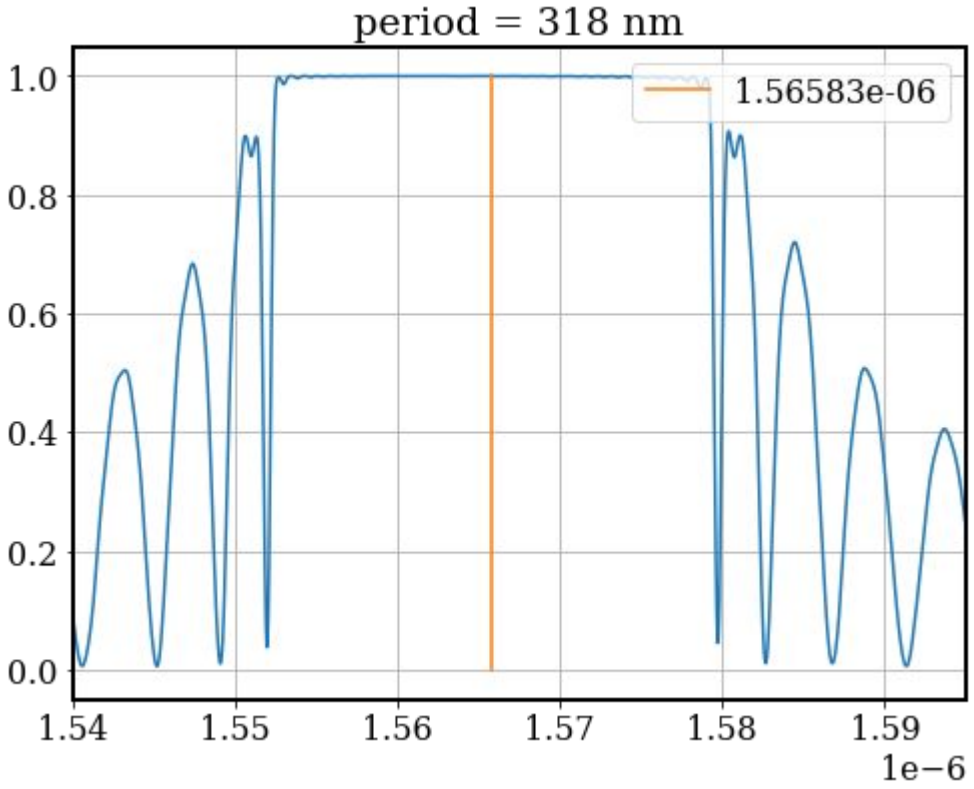
Period = 348.8 nm

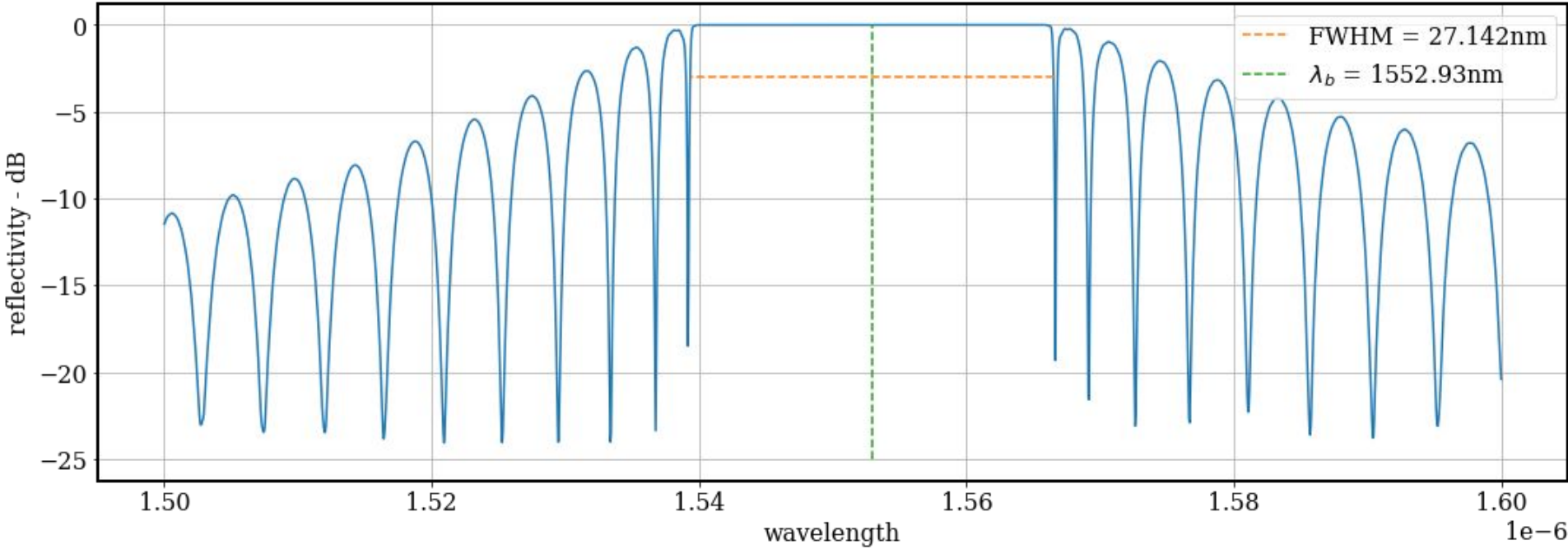
ΔW = 44.3 nm

FDTD SIMULATION



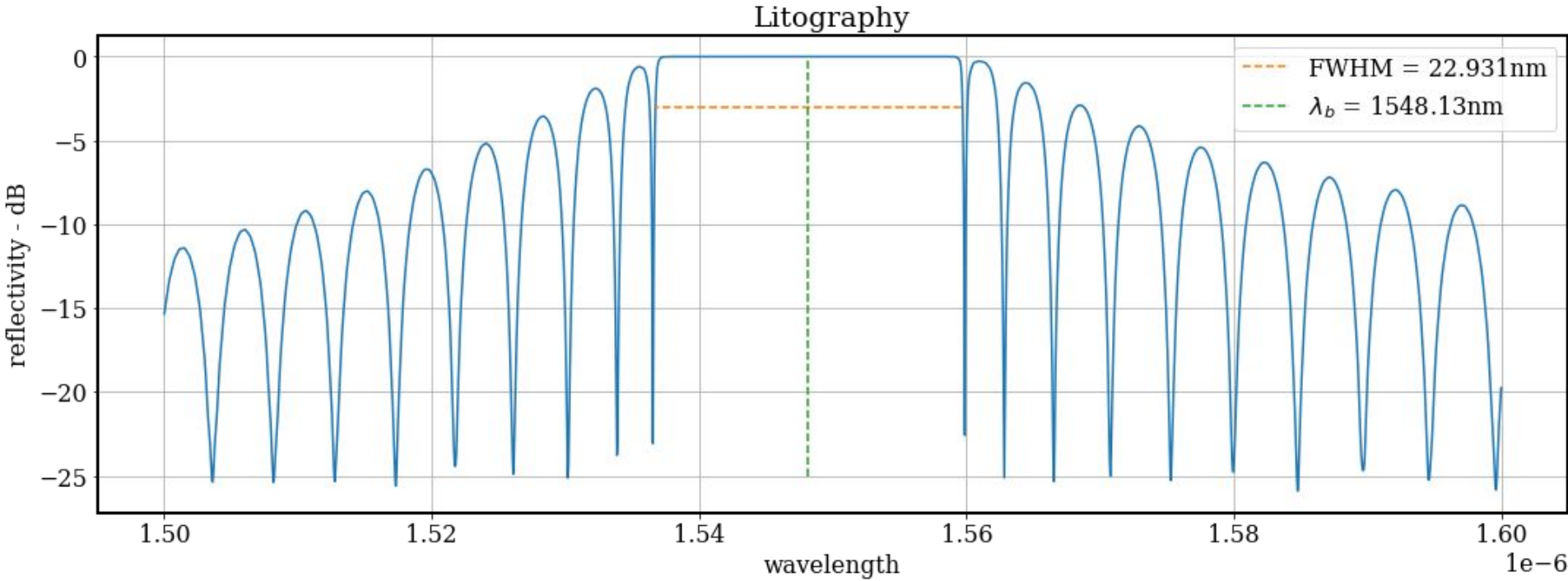

period = 338 nm
1.615375e-06
1.0
0.8
0.6
0.4
0.2
0.0
1.600
1.605
1.610
1.615
1.620
1.625
1.630
1e−6


period = 318 nm
1.56583e-06
1.0
0.8
0.6
0.4
0.2
0.0
1.54
1.55
1.56
1.57
1.58
1.59
1e−6

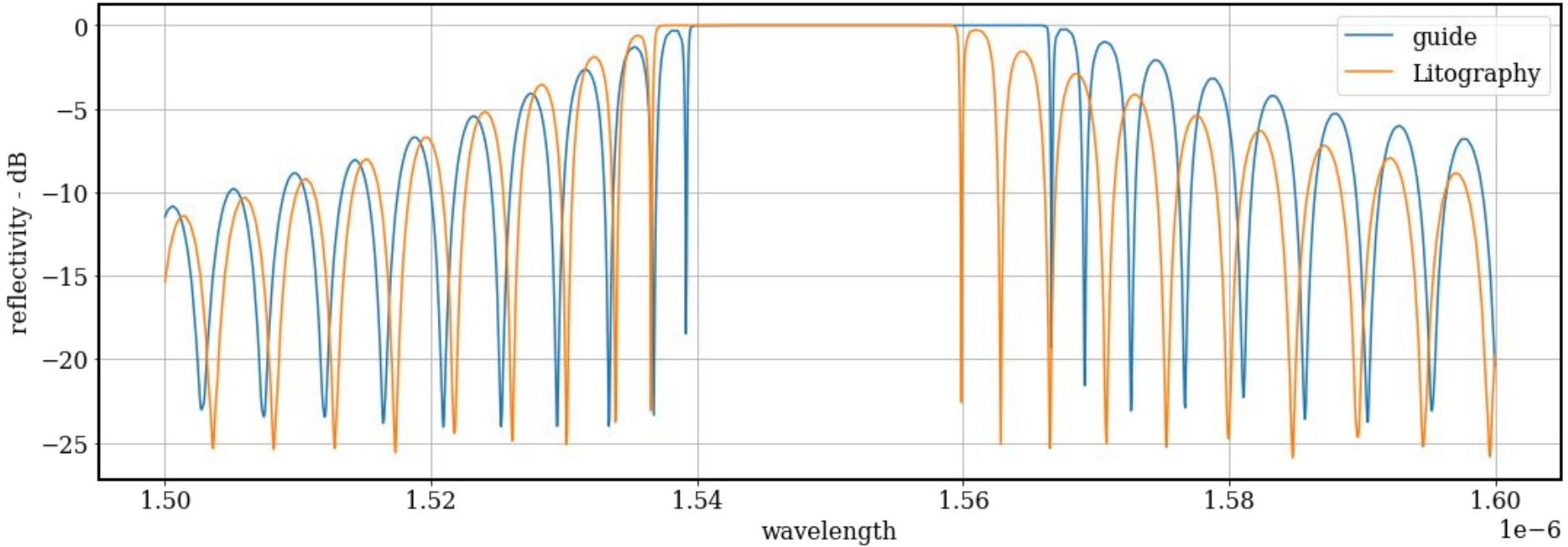


PERIOD = 348.8 nm

LITHOGRAPHY



Period = 348.8 nm



Period = 348.8 nm
FDTD SIMULATION