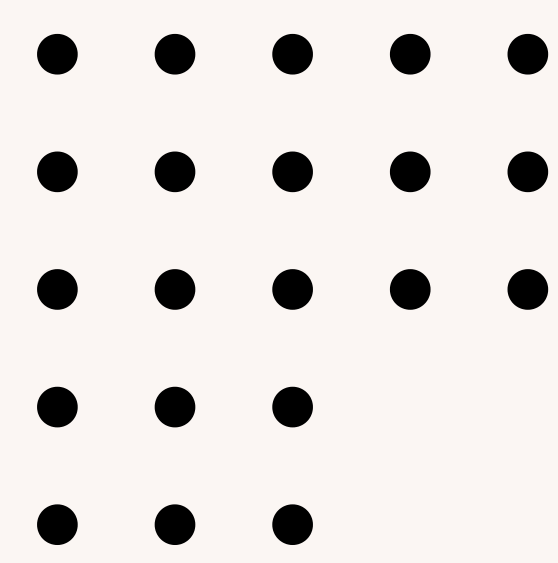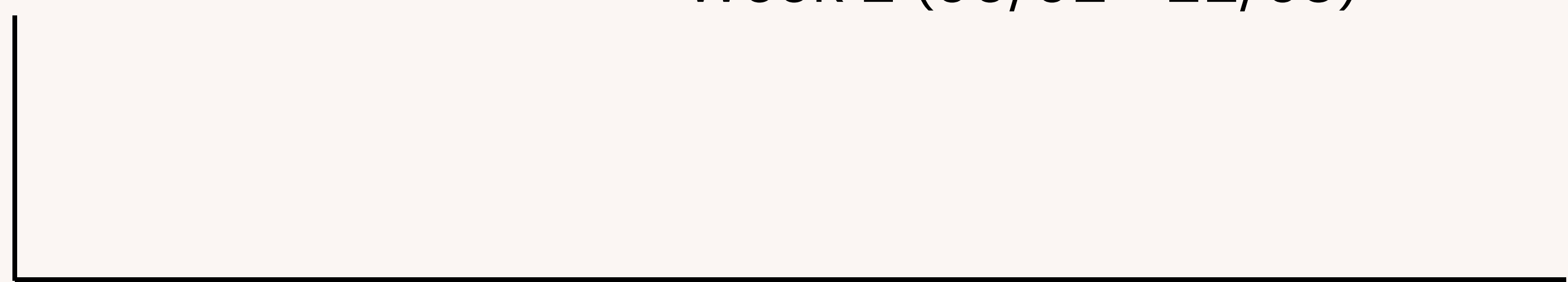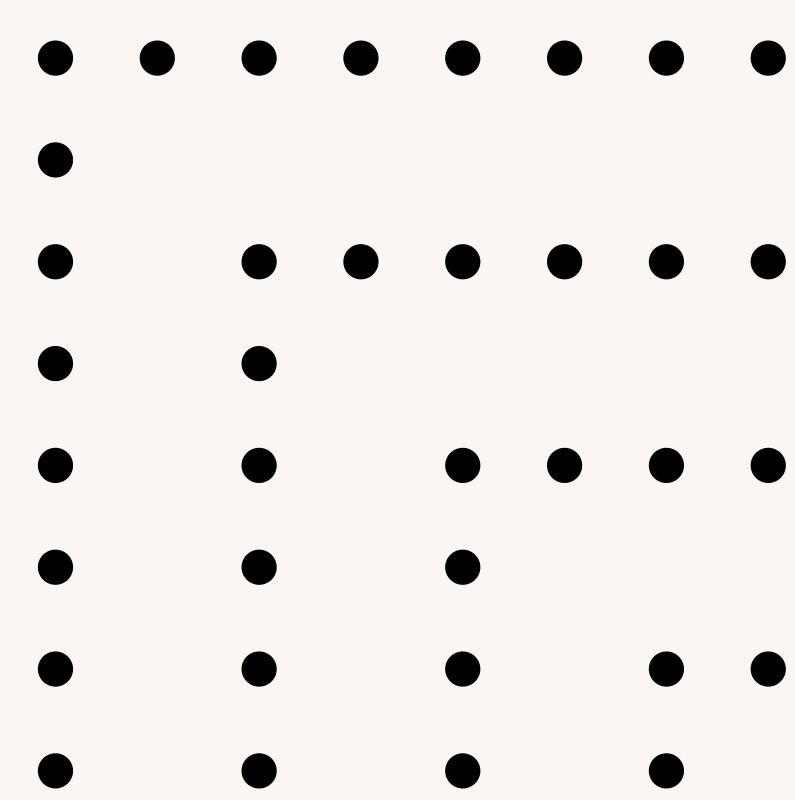# EDGE COUPLER

Leonardo Pessôa

Week 2 (06/02 - 11/03)

OBJECTIVE

Fix the simulation errors obtained on the last week.

PROGRESS AND GOALS

WEEK 1 — (26/02 — 04/03)

- Generate the guide structure for the diferent shapes and start simulation process.

WEEK 2 — (06/02 — 11/03)

- Fix the simulation errors obtained on the last week.

SIMULATION SETTINGS

- Mesh accuracy: 2

- Monitor frequency points: 51

- Simulation time: 5000fs

- FDTD dimensions: y span: 8.5μm, z span: 8.5μm, x span: 205μm

- Boundaries: z: Symmetric, x: PML, y: PML

- Mode dimensions: x: normal, z span: 8.5μm, y span: 8.5μm

- Simulation wavelength: 1500nm – 1600nm

- Mesh on the core: equivalent x,y,z index: 5

- Output monitor dimensions: y span: 3μm, zspan: 3μm
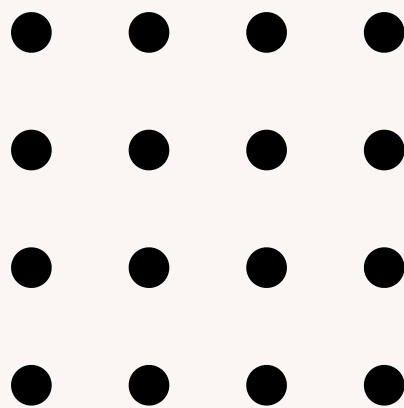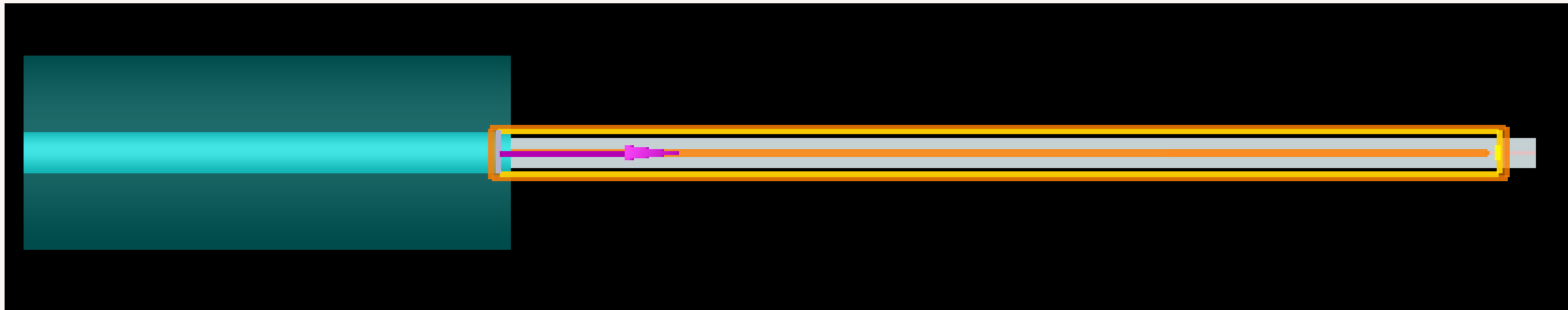
COMPONENT

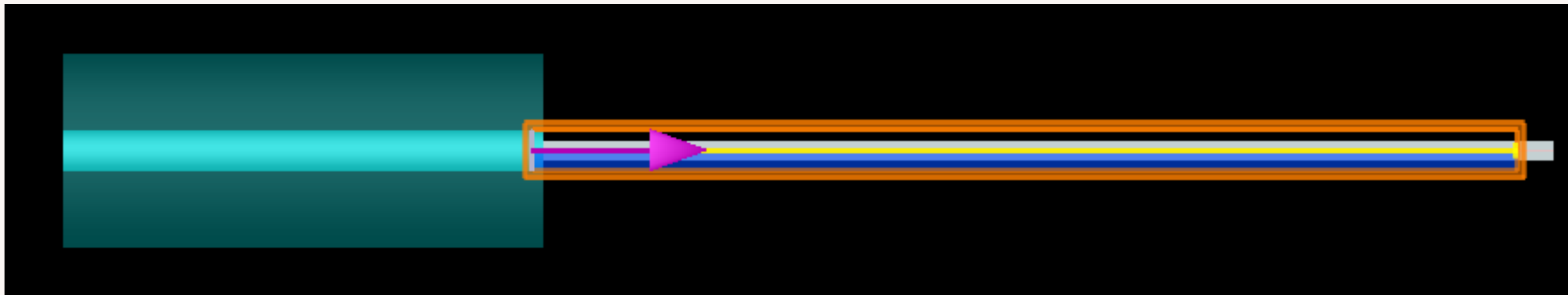Figure 1: Component XY View

Figure 2: Component XZ View

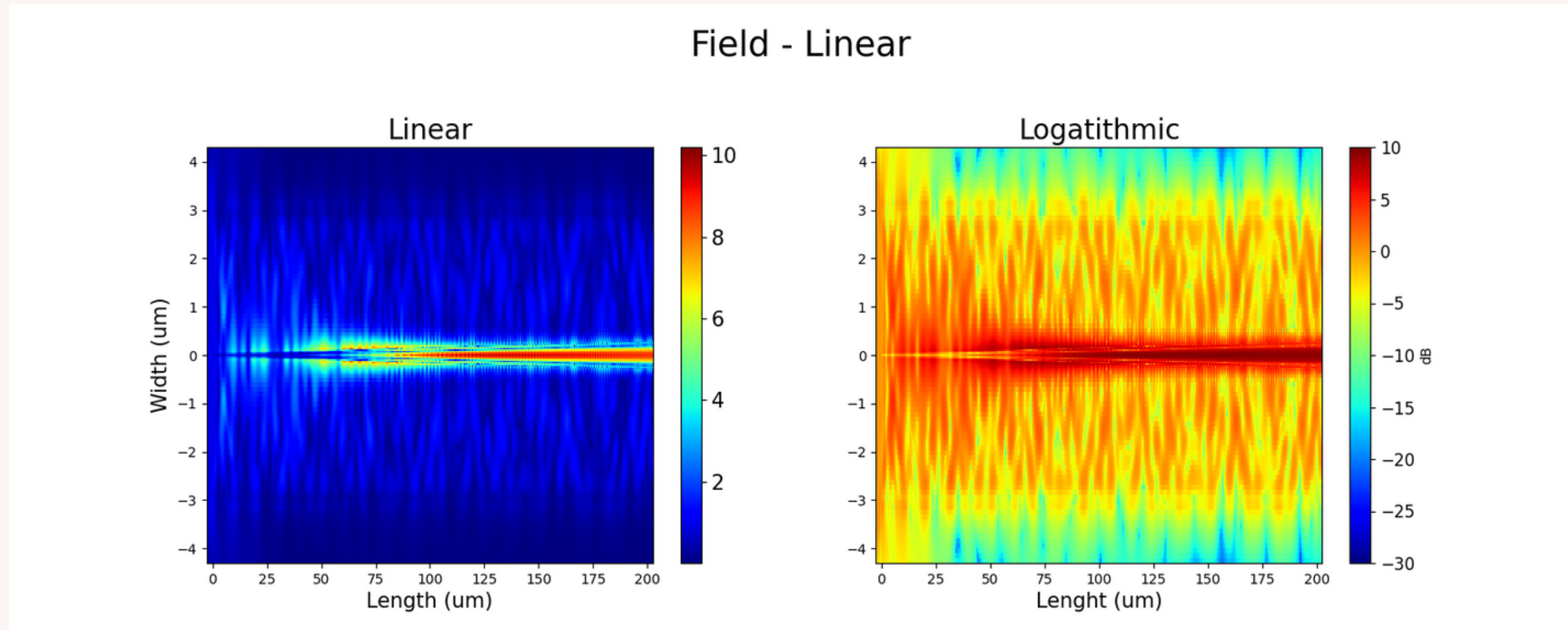# LINEAR TAPER

FIELD
Ex polarization

Figure 3: Field (Linear)
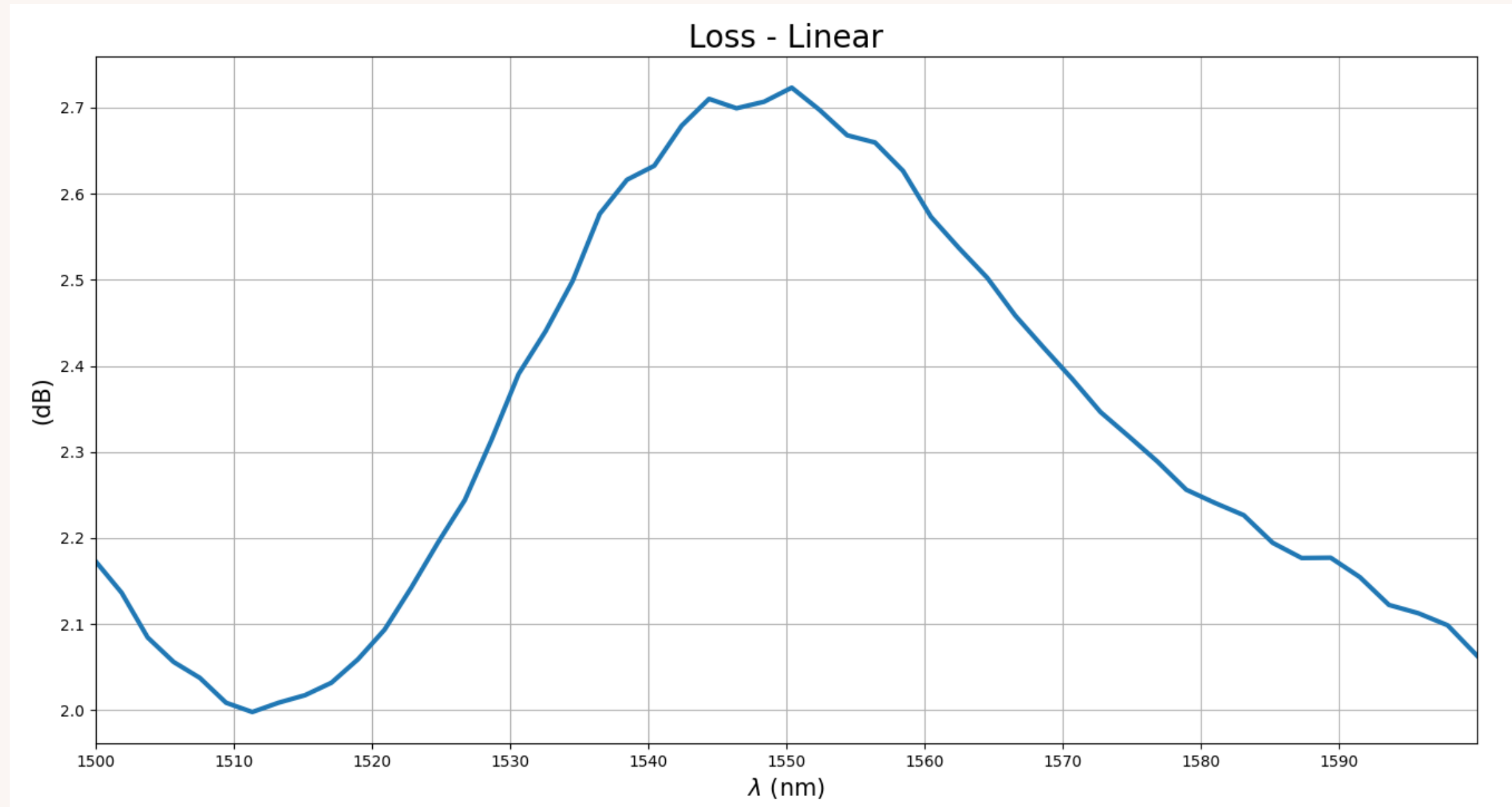
INSERTION LOSS

Figure 4: Insertion Loss (Linear)

EXPONENTIAL TAPER
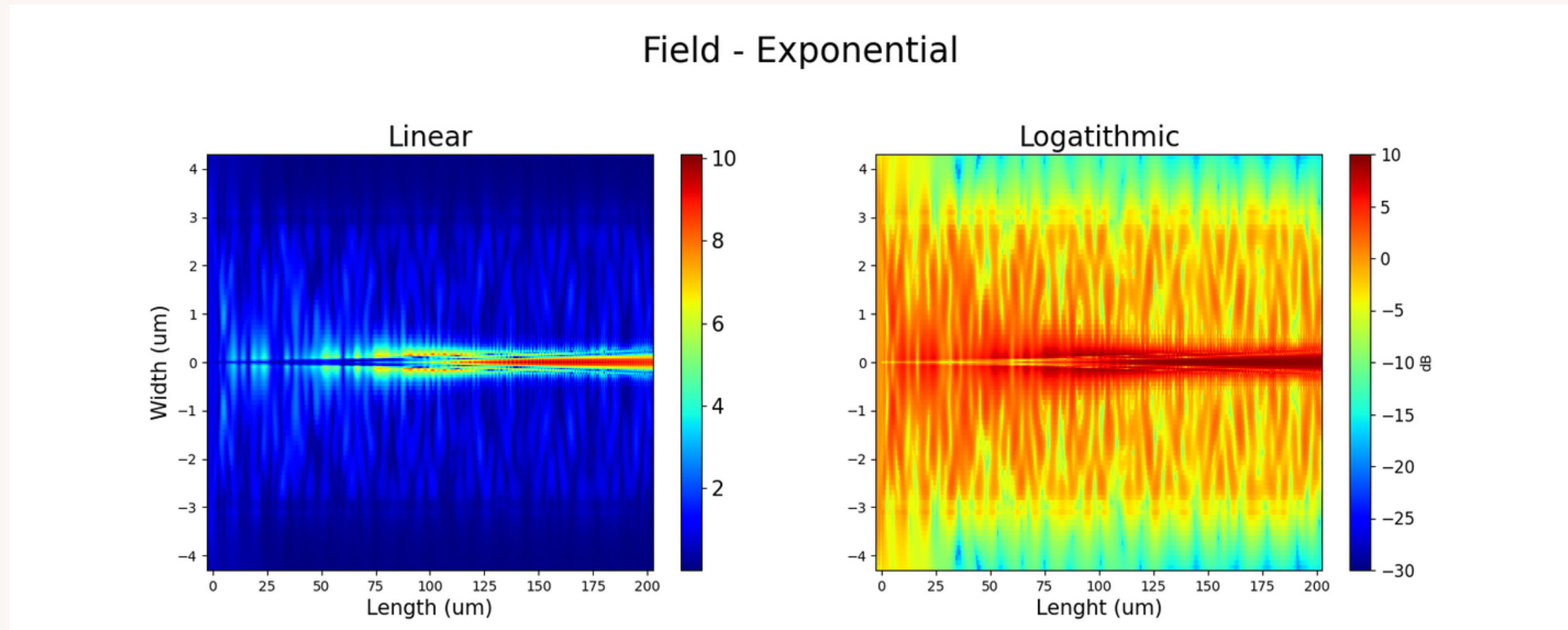
FIELD
Ex polarization

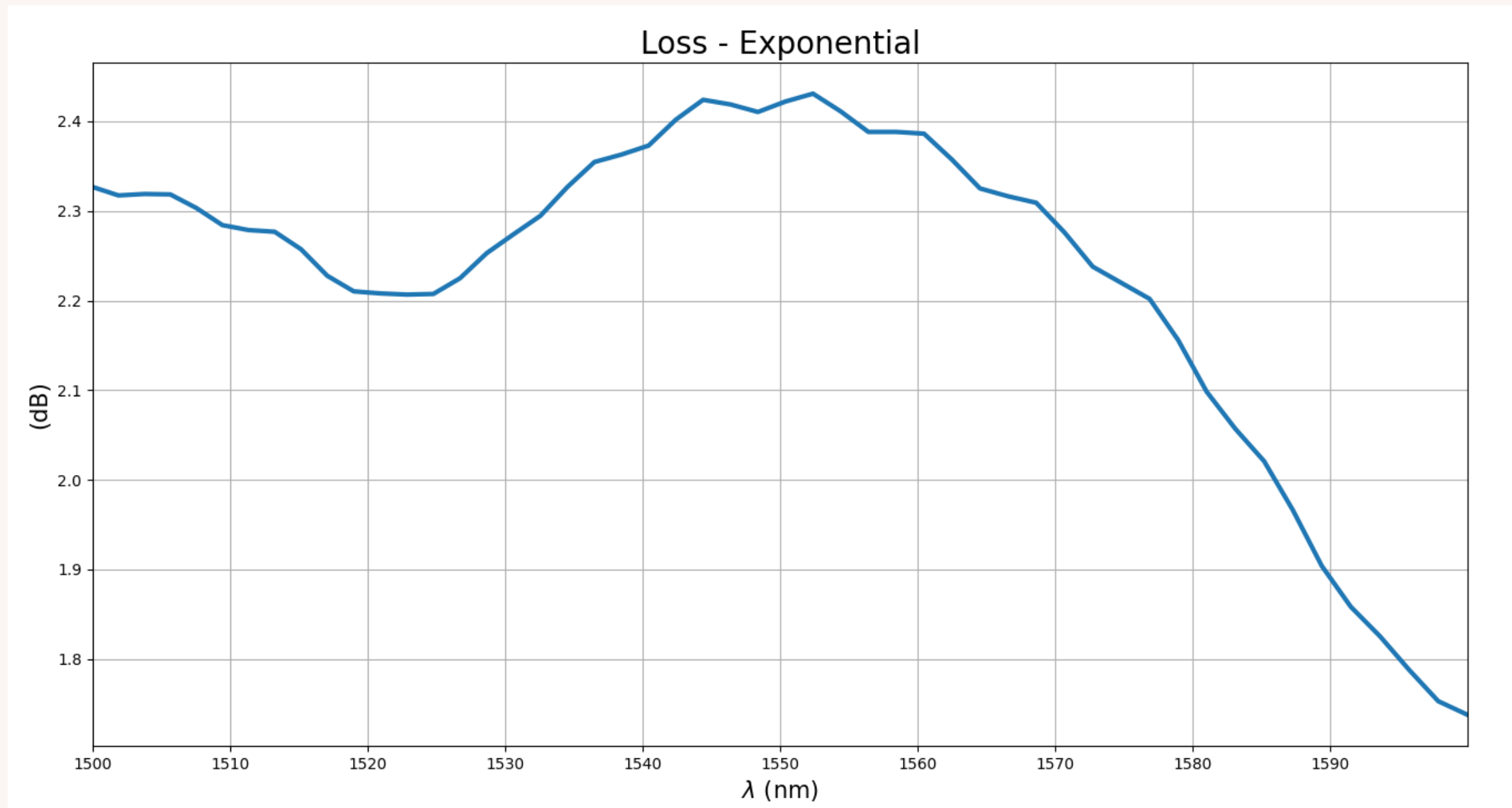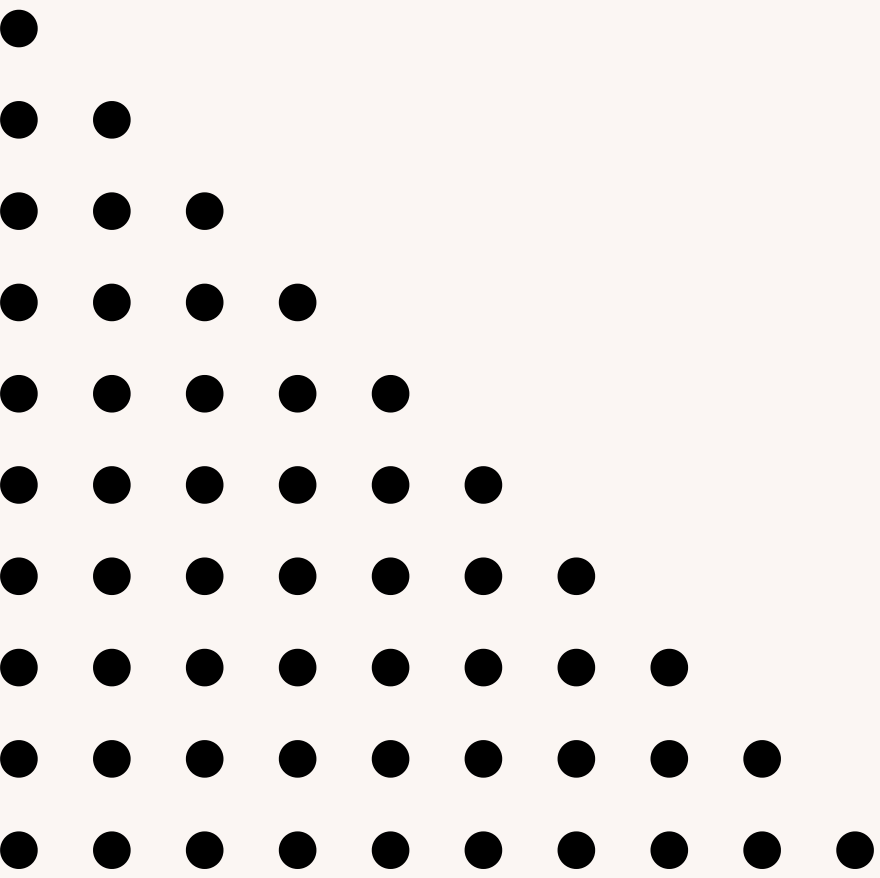Figure 5: Field (Exponential)

INSERTION LOSS

Figure 6: Insertion Loss (Exponential)

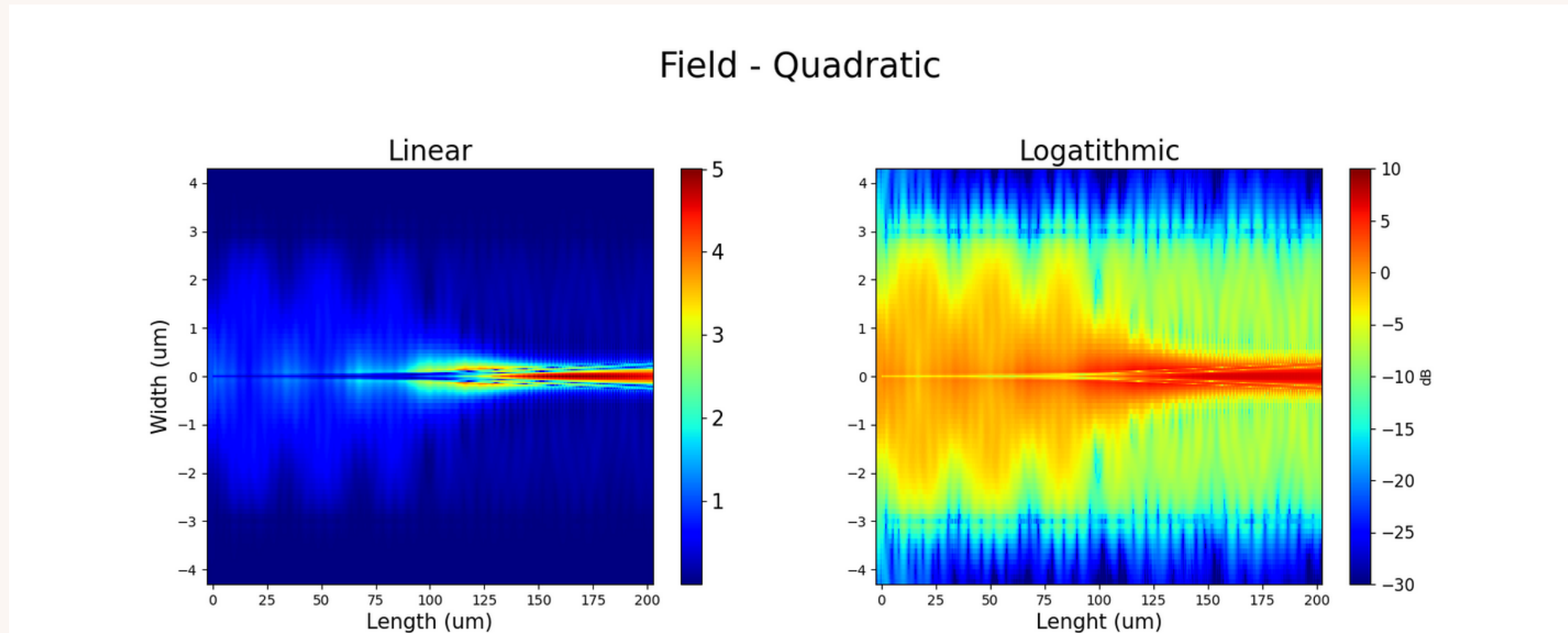# QUADRATIC TAPER

FIELD

Ex polarization

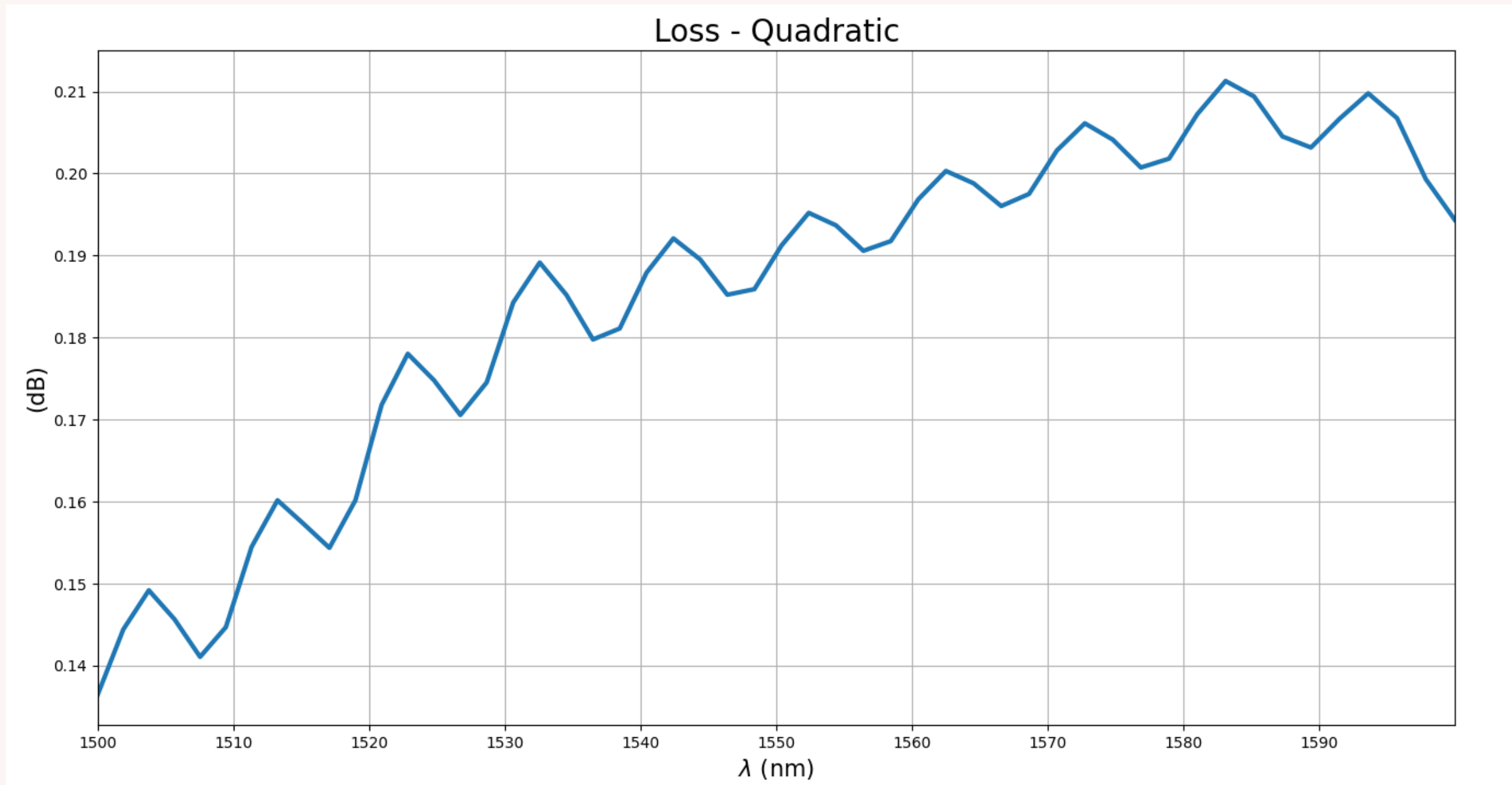Figure 7: Field (Linear)

INSERTION LOSS

Figure 8: Insertion Loss (Linear)

CONCLUSION

- Due to the extense simulation time and the fact that this simulations are tests to see what guide should be used, the low fdtd mesh still have awkward results even with the core mesh. The solution will be increase the mesh accuracy.

- Besides the mesh, the other simulation settings apparently are satisfactory.
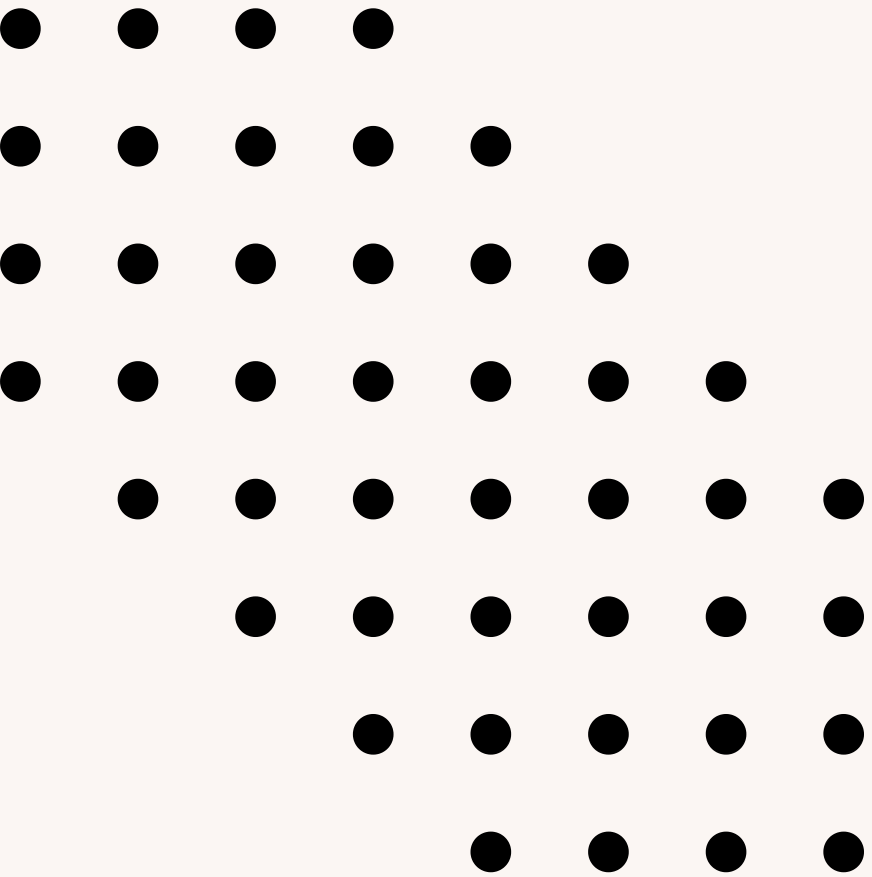
References

[1] Mu, Xin, et al. "Edge couplers in silicon photonic integrated circuits: A review." Applied Sciences 10.4 (2020): 1538.

[2] Ren, Guanghui, et al. "Study on inverse taper based mode transformer for low loss coupling between silicon wire waveguide and lensed fiber." Optics Communications 284.19 (2011): 4782–4788.