

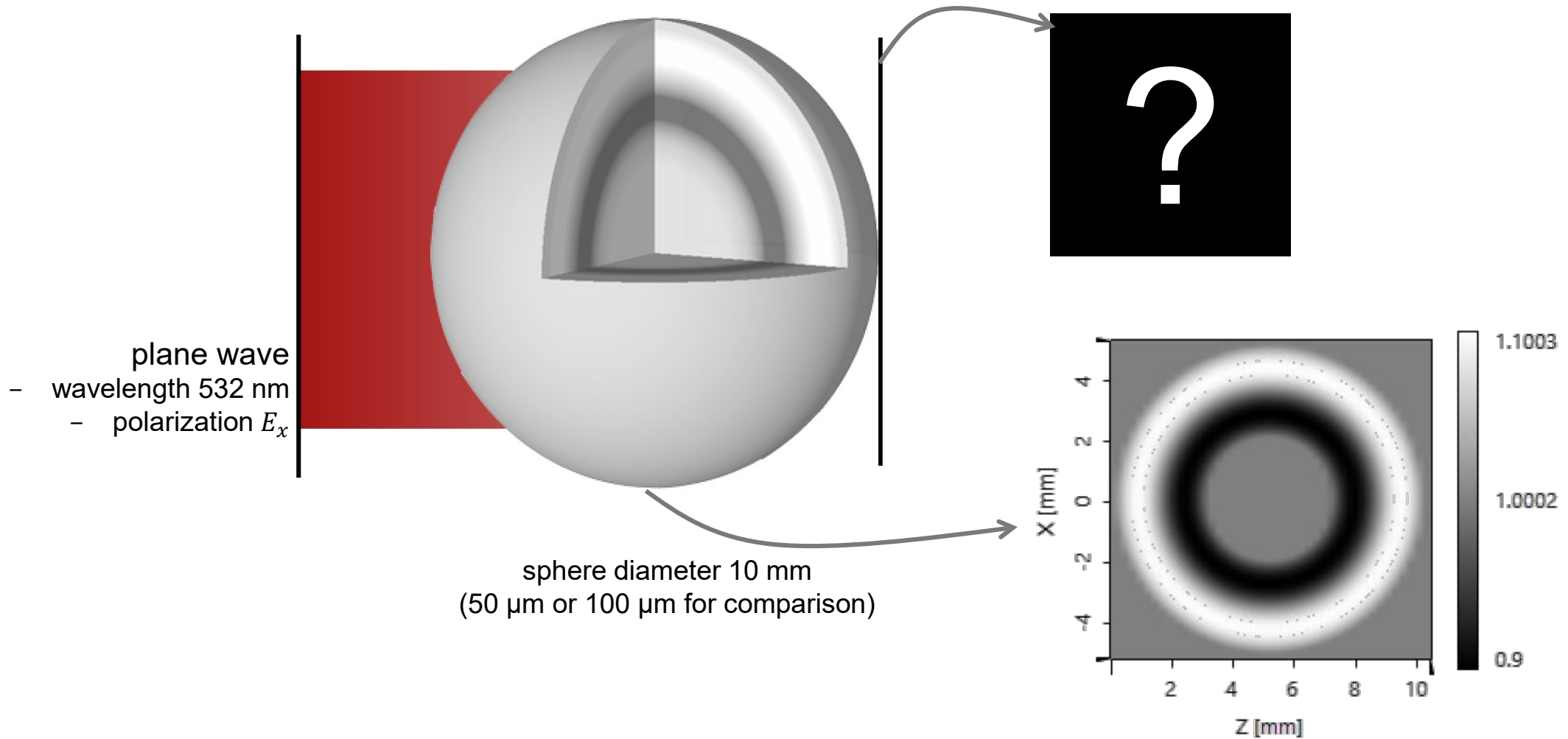
Modeling of Optical System with Graded-Index Sphere

Abstract

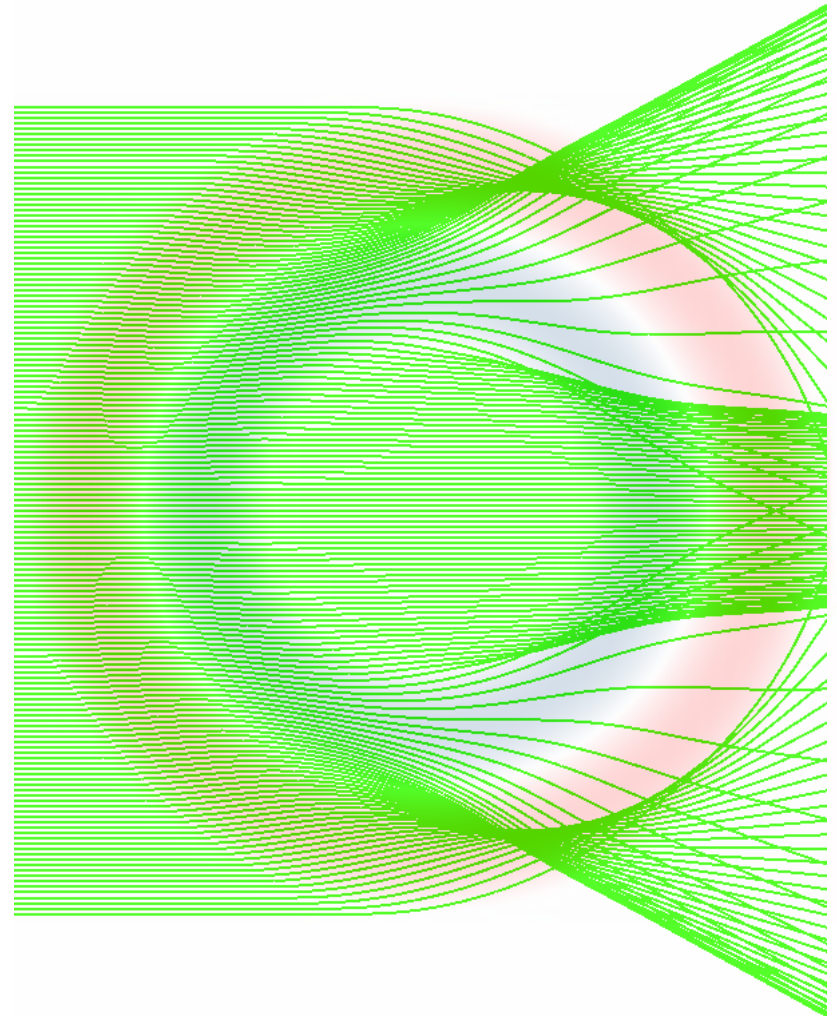
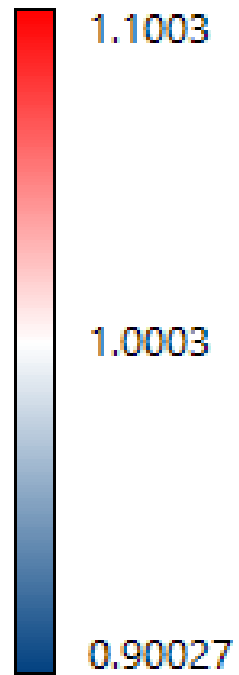
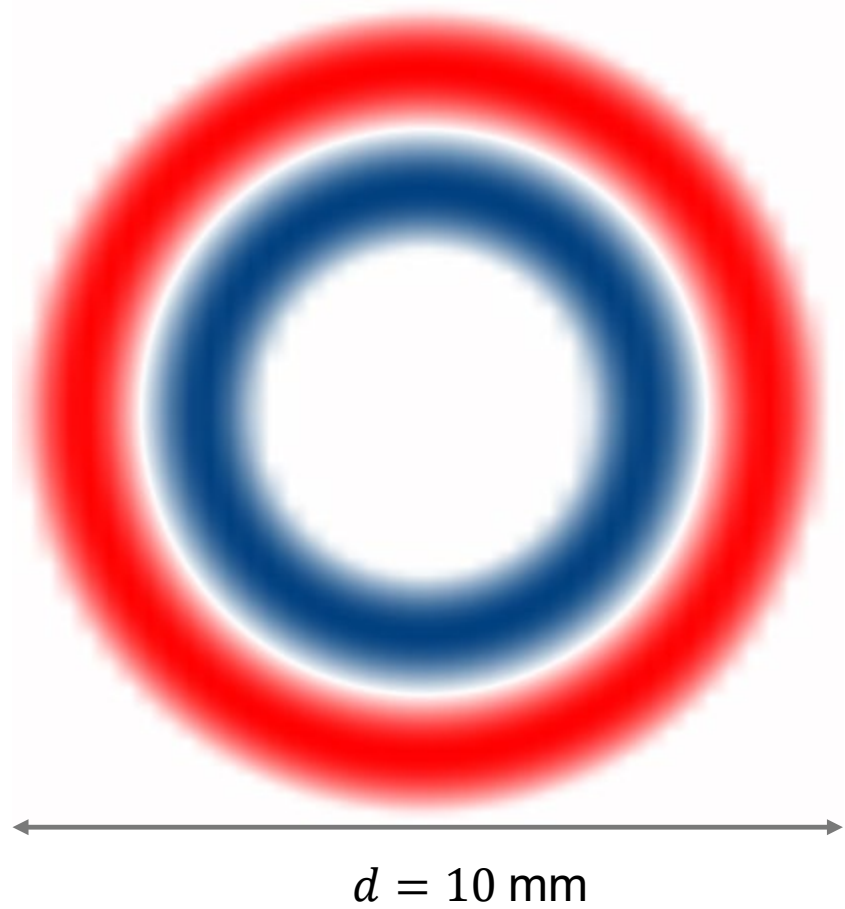


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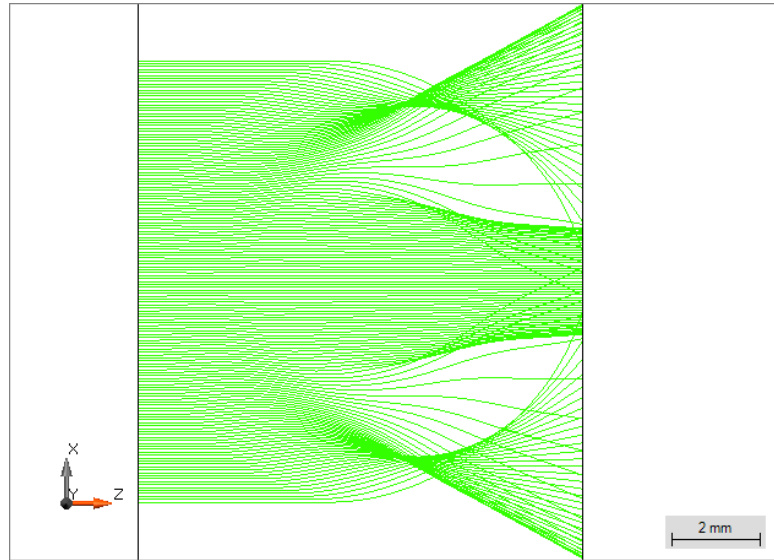
Task 1: Description



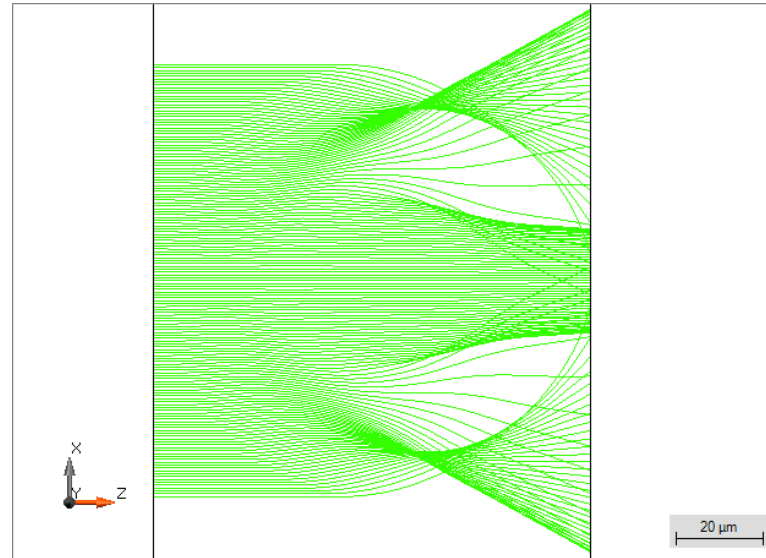
Ray Tracing Result



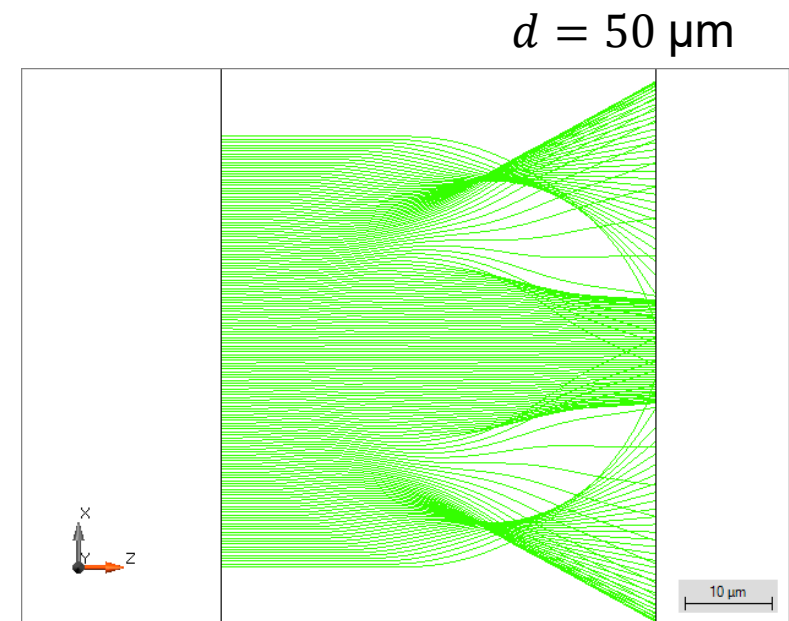
Ray Tracing: Shrink the Ball Proportionally



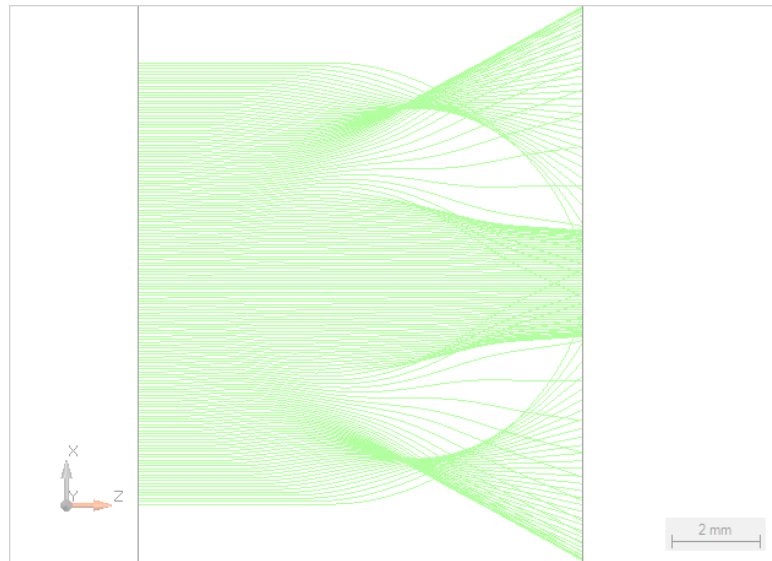
$d = 10 \text{ mm}$



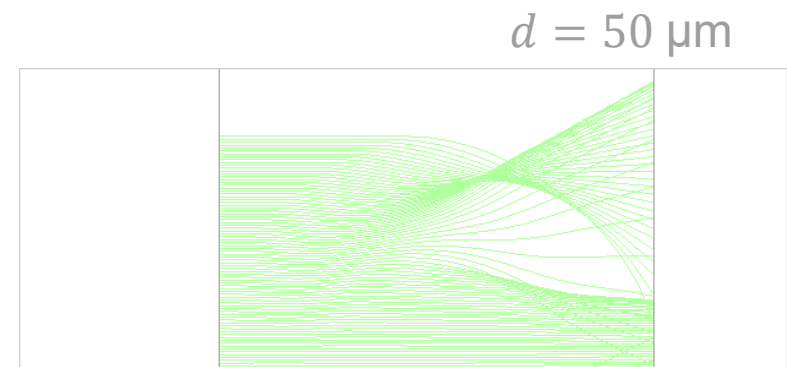
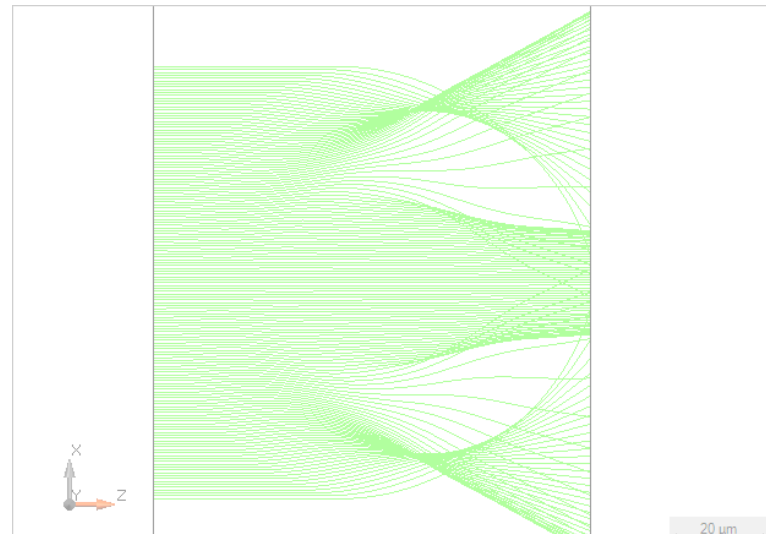
$d = 100 \mu\text{m}$



Ray Tracing: Shrink the Ball Proportionally



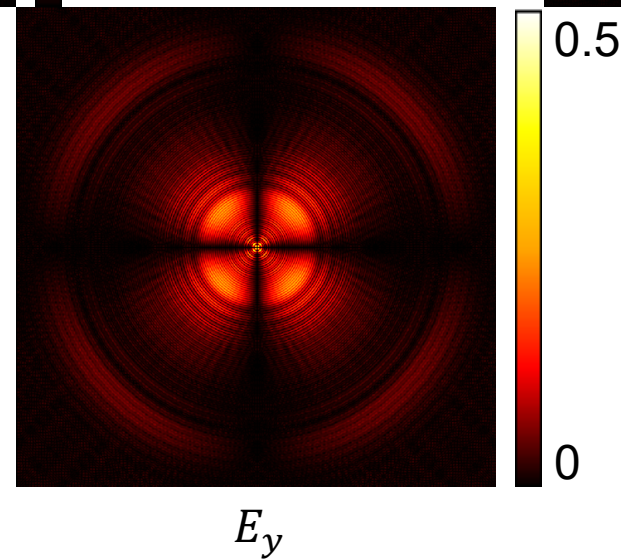
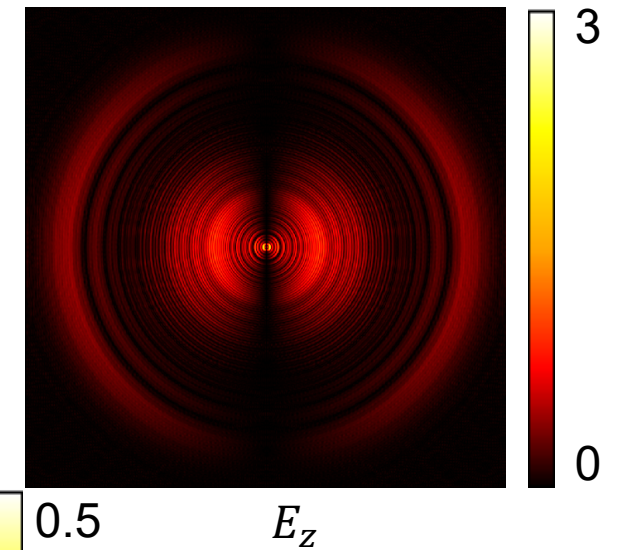
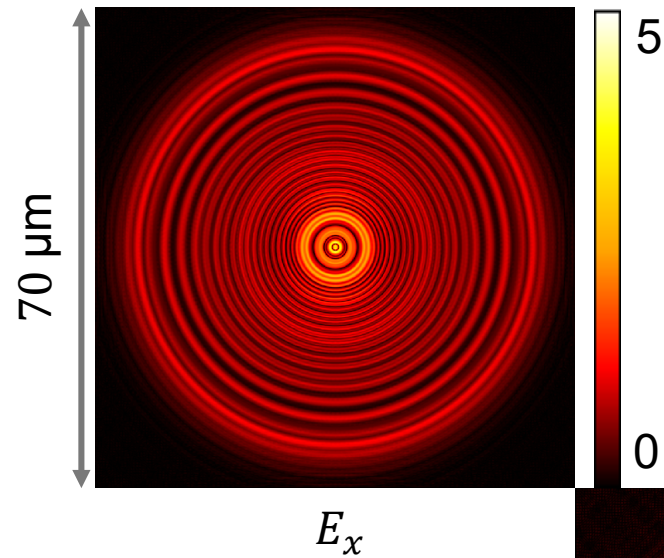
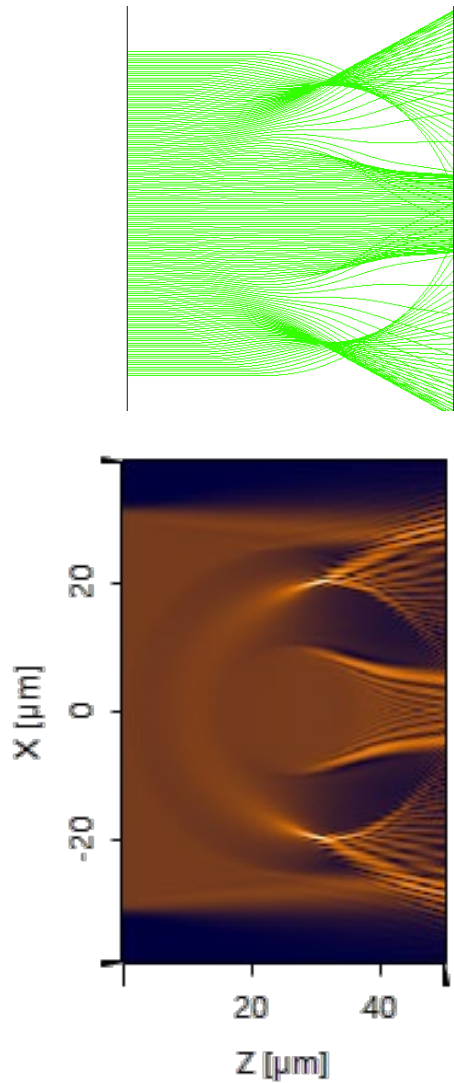
$d = 10 \text{ mm}$



We can see from the ray tracing results:

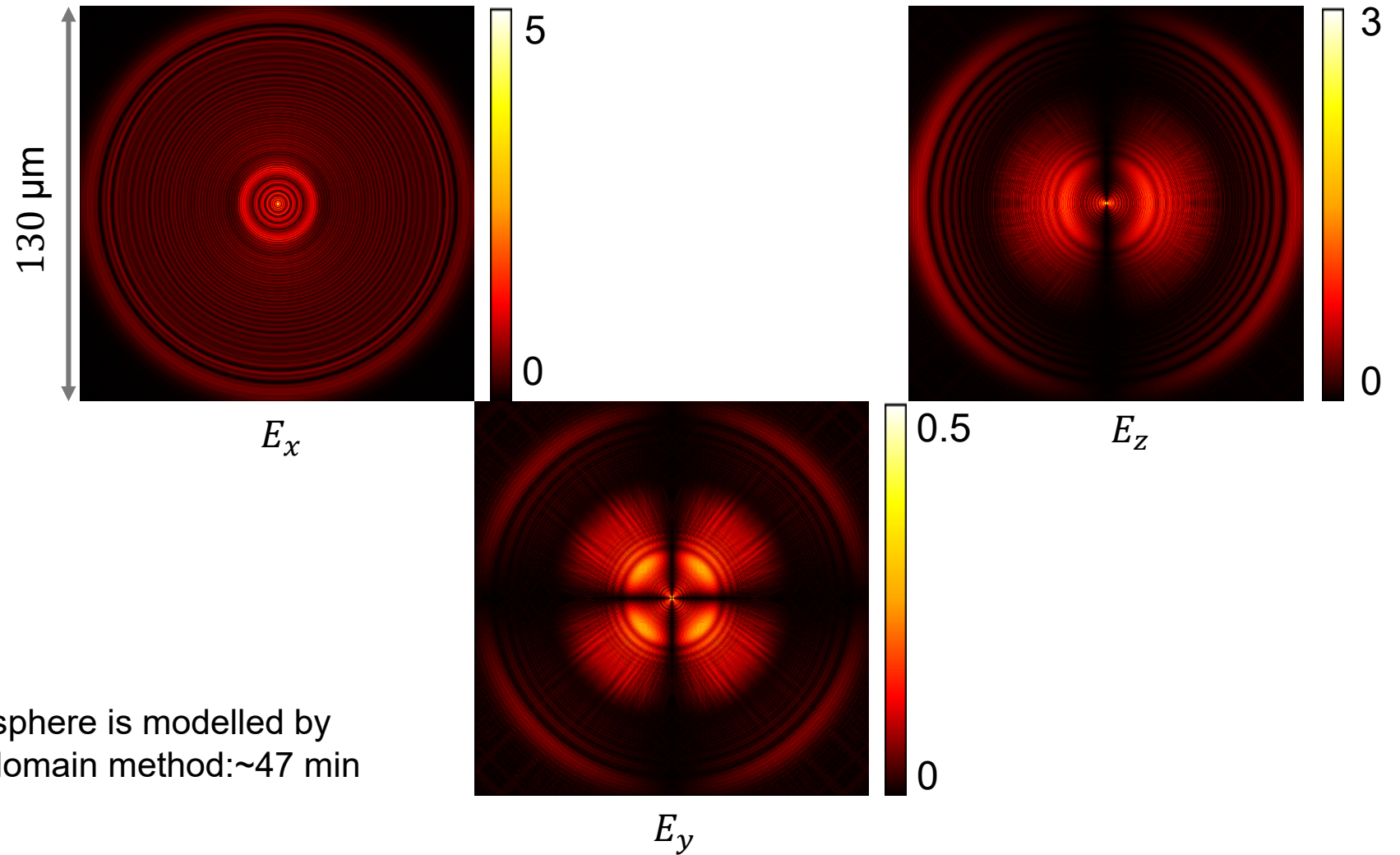
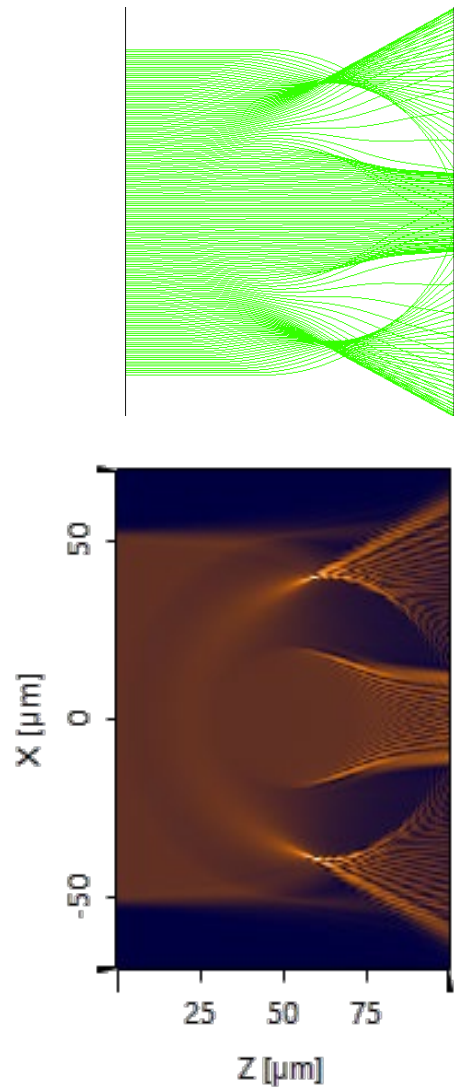
- When scaling the size of the ball, ray tracing results are identically scaled. So we can expect, the related field tracing results are similar but also scaled.

Field Tracing Results: $d = 50 \mu\text{m}$ (Amplitude)



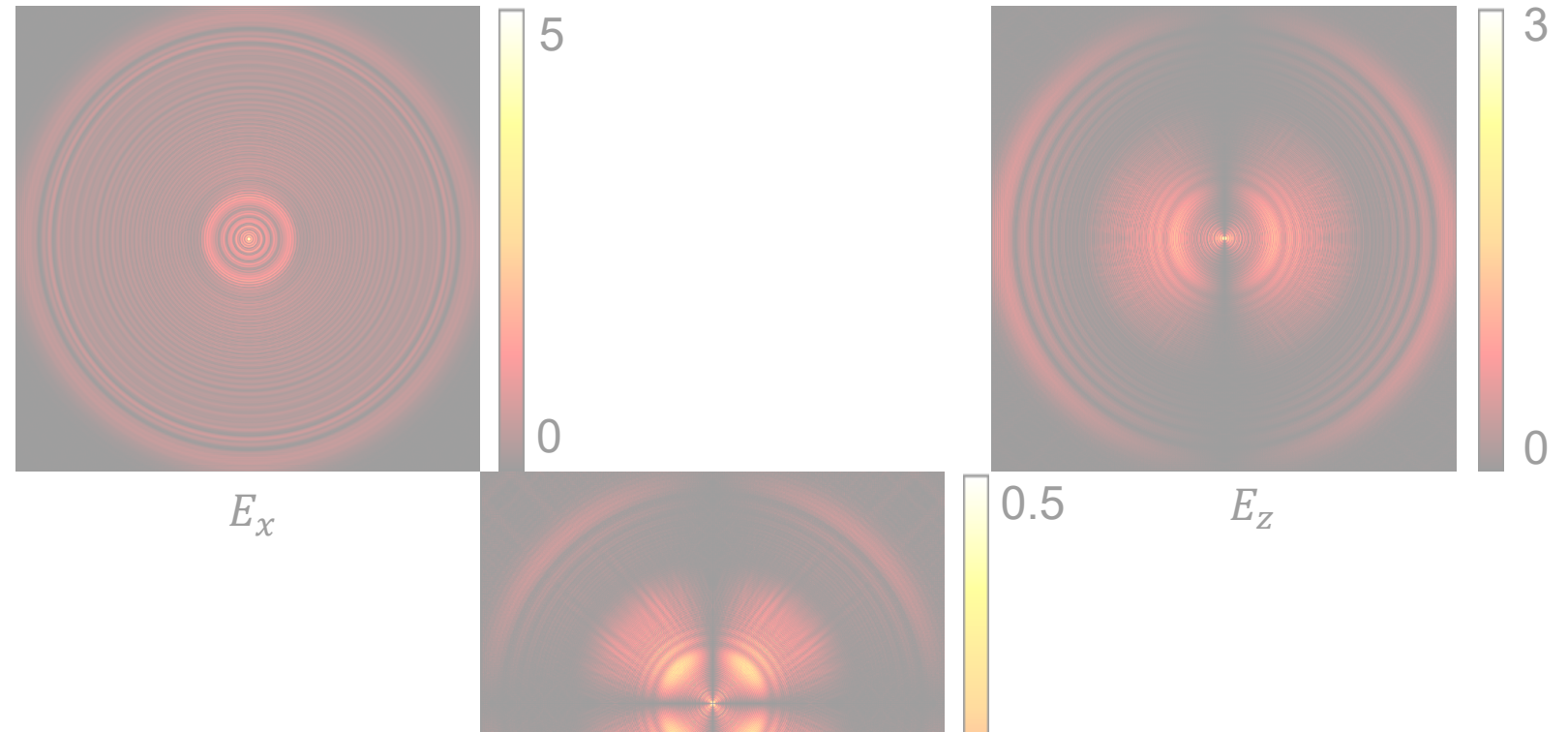
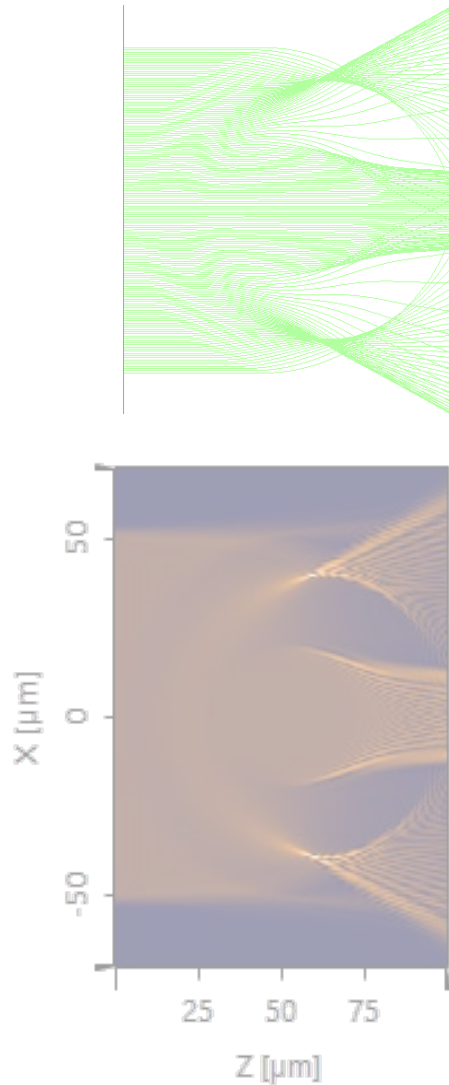
GRIN sphere is modelled by
RK k -domain method: ~8 min

Field Tracing Results: $d = 100 \mu\text{m}$ (Amplitude)



GRIN sphere is modelled by
RK k -domain method: ~47 min

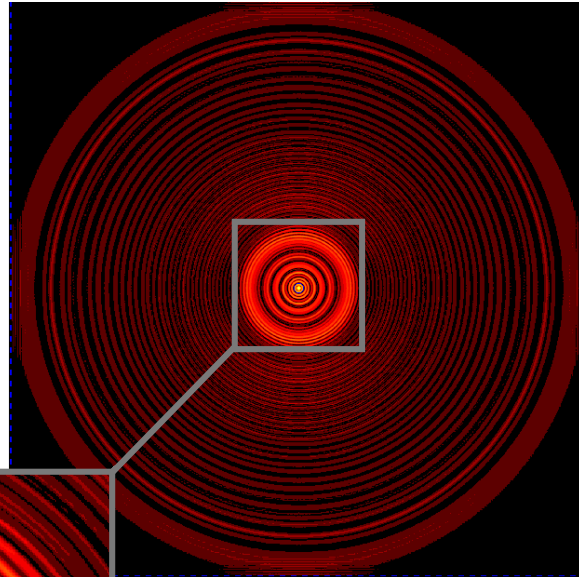
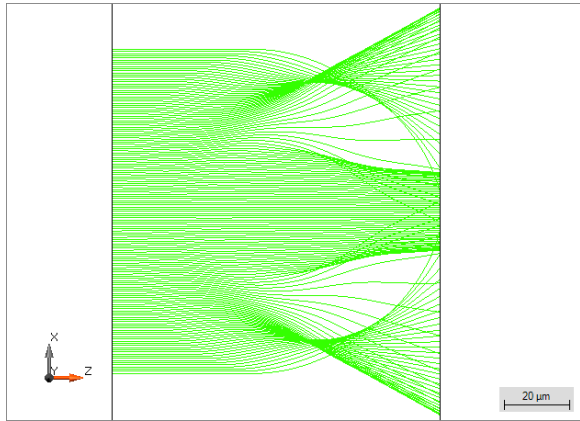
Field Tracing Results: $d = 100 \mu\text{m}$ (Amplitude)



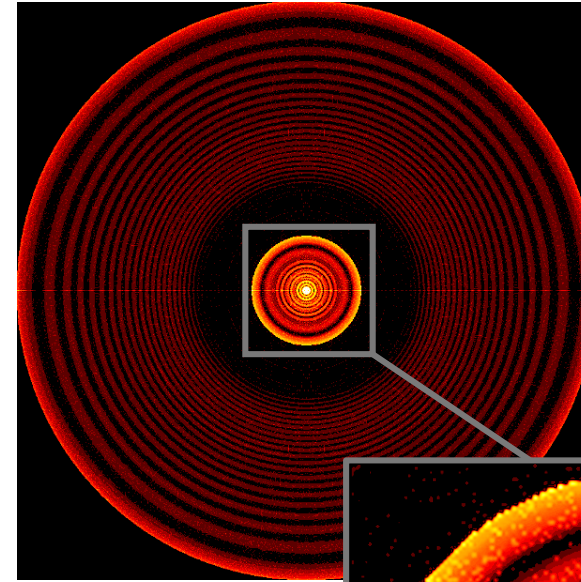
We can see from the field tracing results:

- The field distribution is similar as the the prediction of ray tracing result (When the sphere enlarged, calculation time of RK k -domain method increase dramatically)

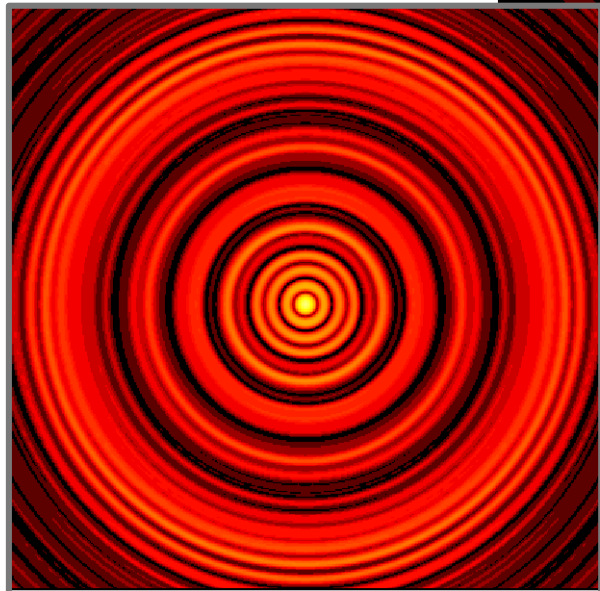
Field Tracing Results: $d = 100 \mu\text{m}$ (Energy Density)



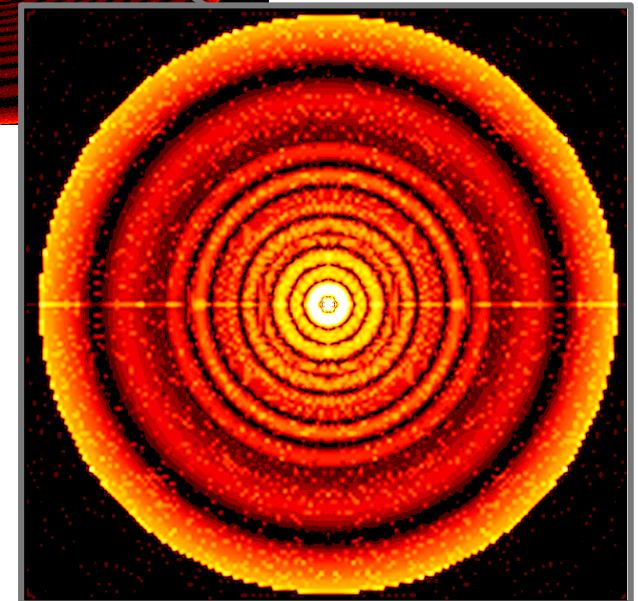
RK k -domain method



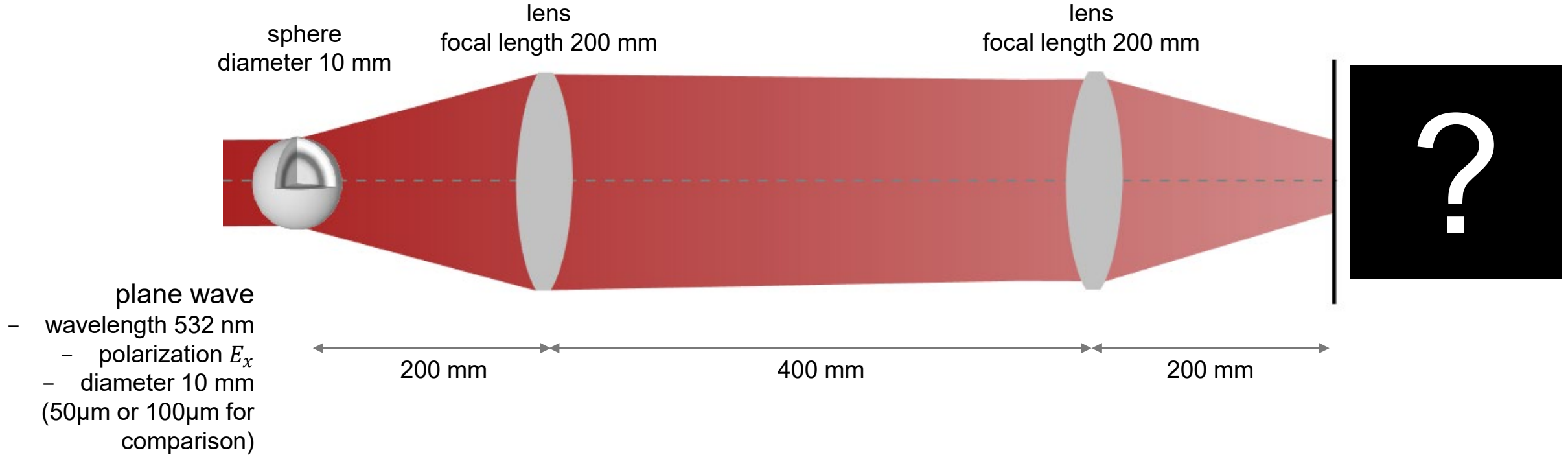
RK x -domain method



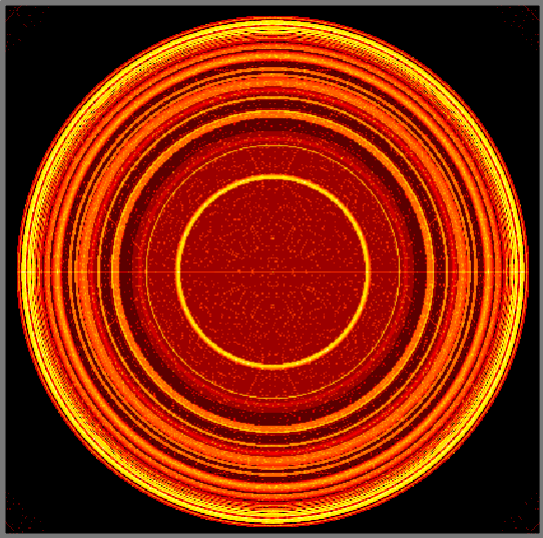
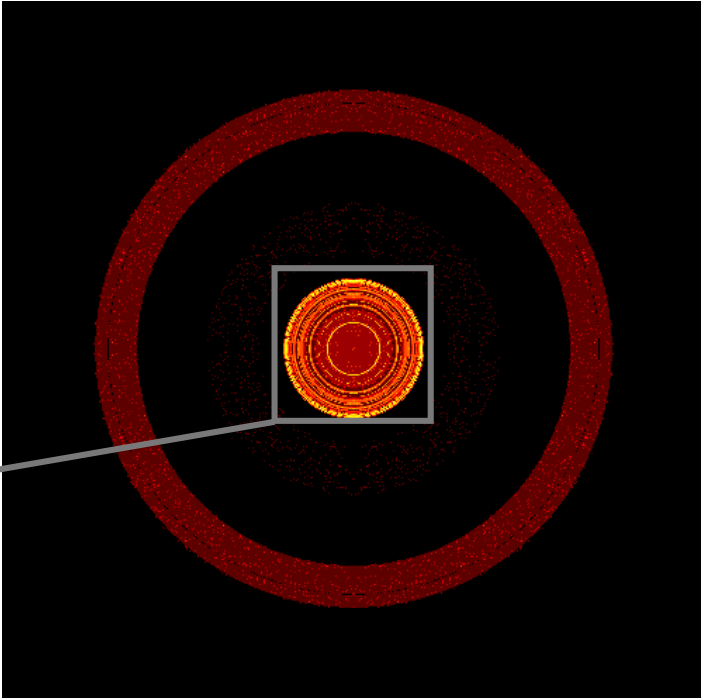
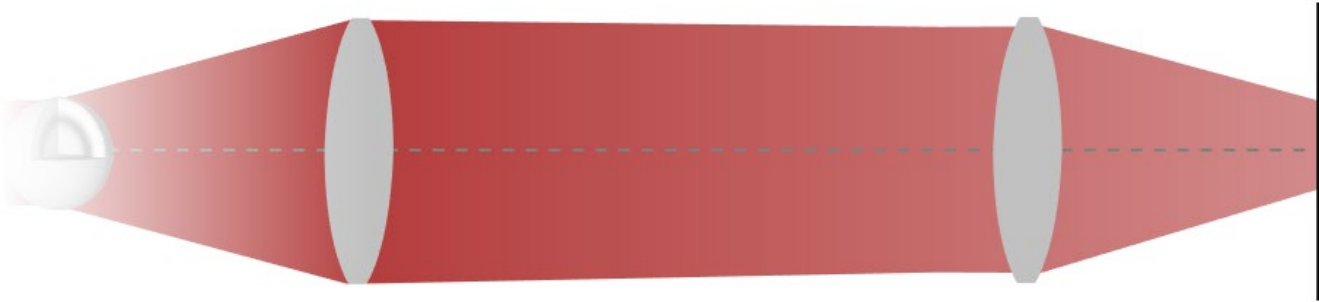
Detector interpolation
from the degenerated
mesh



Task 2: Description



Field Tracing Results: Energy Density



Document Information

title	Modeling of optical system with graded-index sphere
document code	Demo.20
version	1.0
VL version used for simulations	VirtualLab Fusion Winter Release 2019 (2019.4.0.72)
category	Demo
further reading	- ...
