Design Exercise 1

Double Slit Experiment
- FDTD Simulation -

High-Speed Circuits & Systems Lab.
Dept. of Electrical and Electronic Engineering
Yonsei University

Lumerical Solutions

Our Products

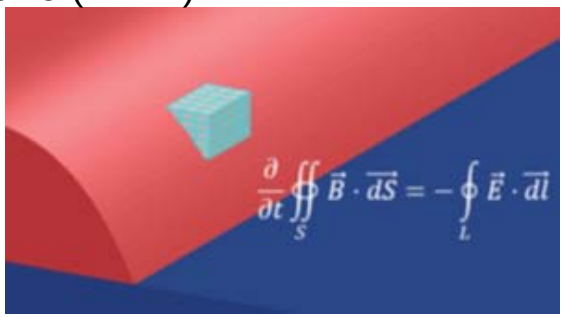
FDTD Solutions: Single and multi-processor finite-difference time-domain optical design software.
Product Details | Trial Download

MODE Solutions: Waveguide eigenmode solver and omni-directional broadband propagator design software.
Product Details | Trial Download

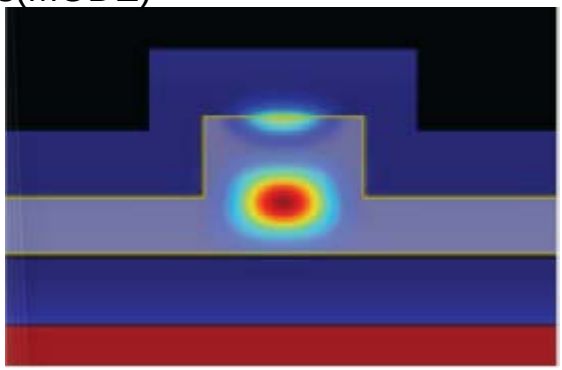
INTERCONNECT: Optoelectronic and photonic integrated circuit (PIC) design software package.
Product Details | Trial Download

DEVICE: Powerful semiconductor TCAD device simulation software for silicon-based optoelectronic structures.
Product Details | Trial Download

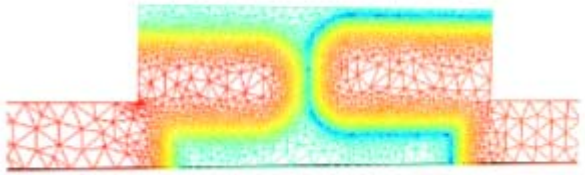
3D Maxwell solver(FDTD)



Modal analysis(MODE)

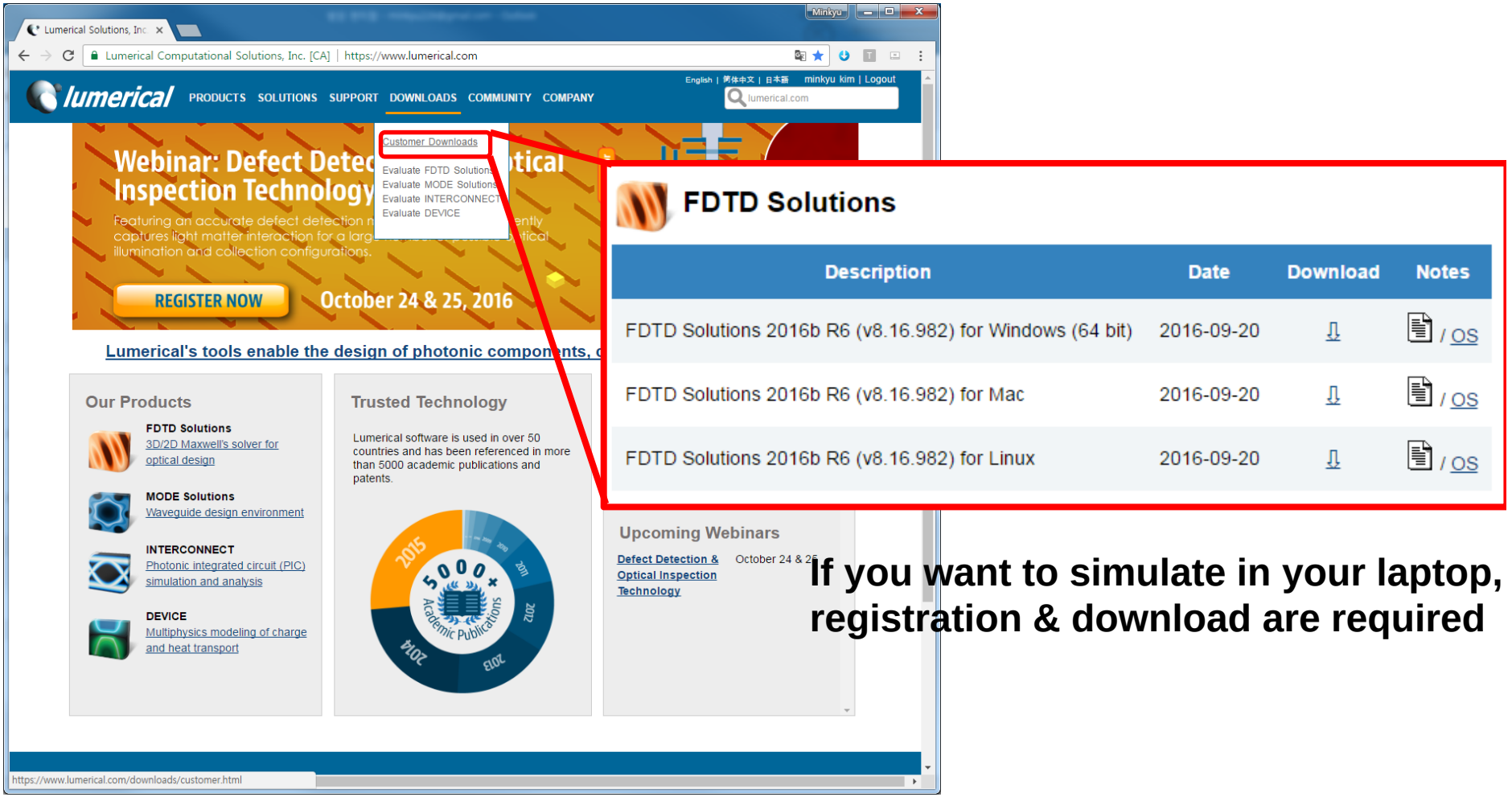


Charge transport & heat transfer(DEVICE)



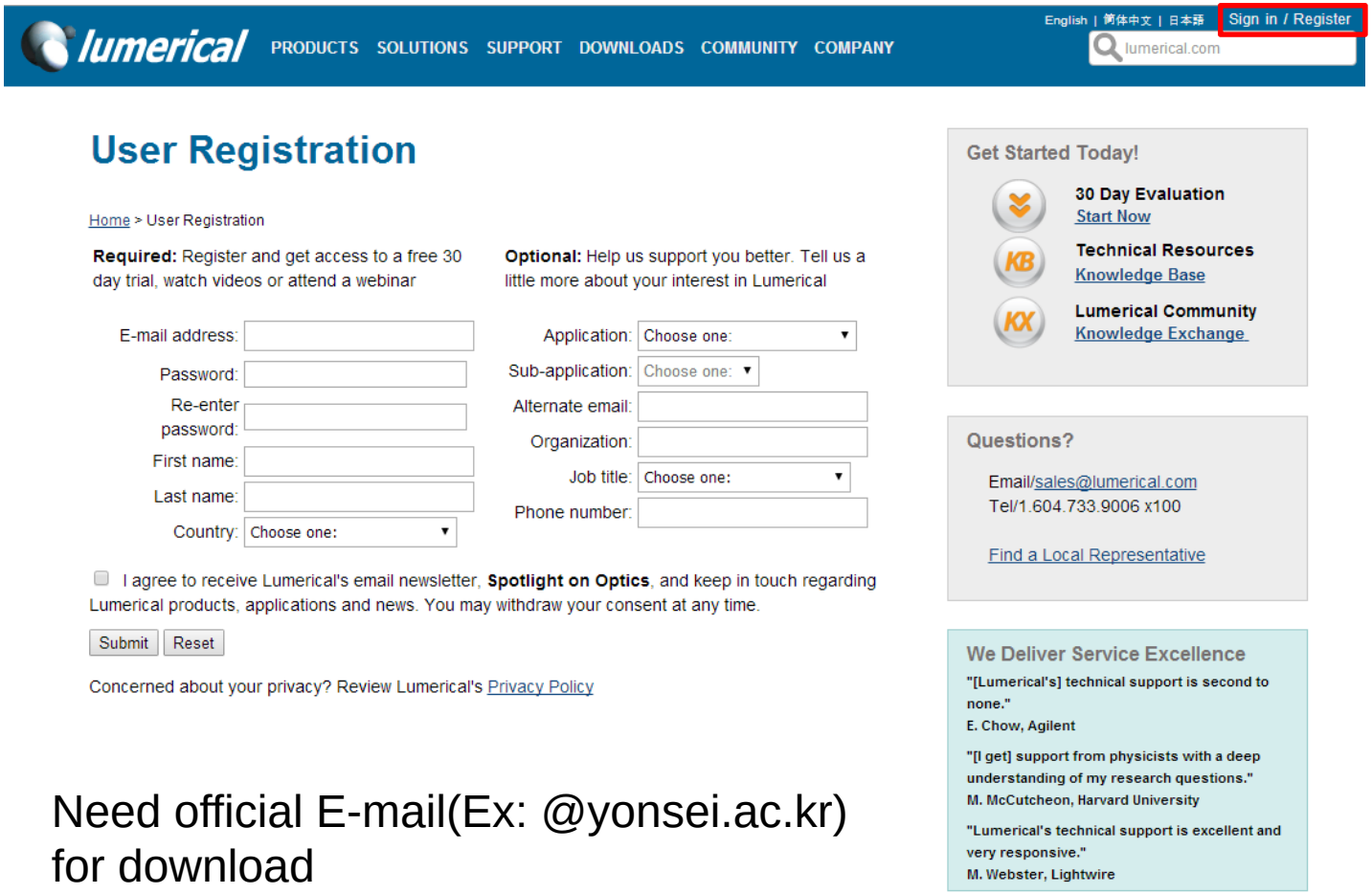
How To Download

- **www.lumerical.com**



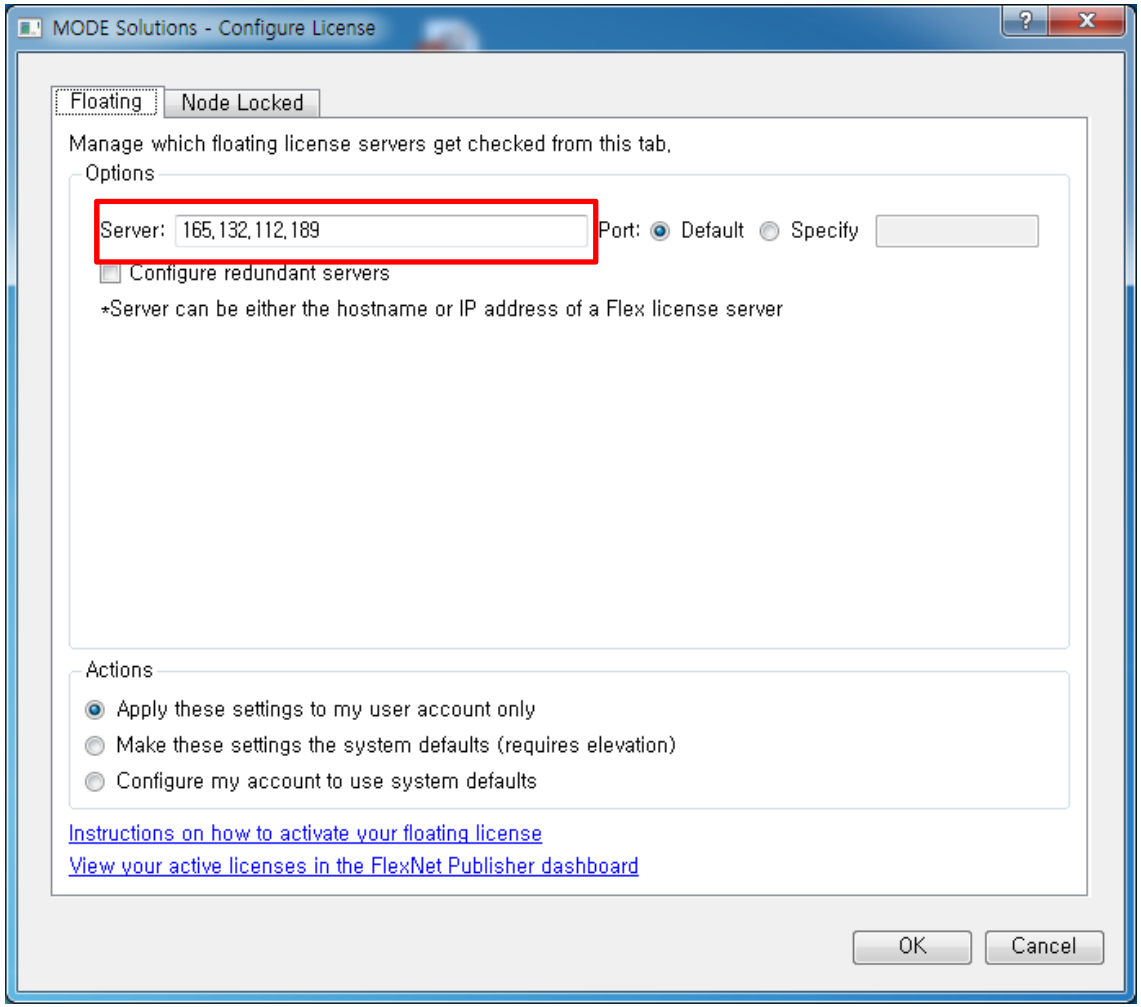
If you want to simulate in your laptop, registration & download are required

Registration for Download



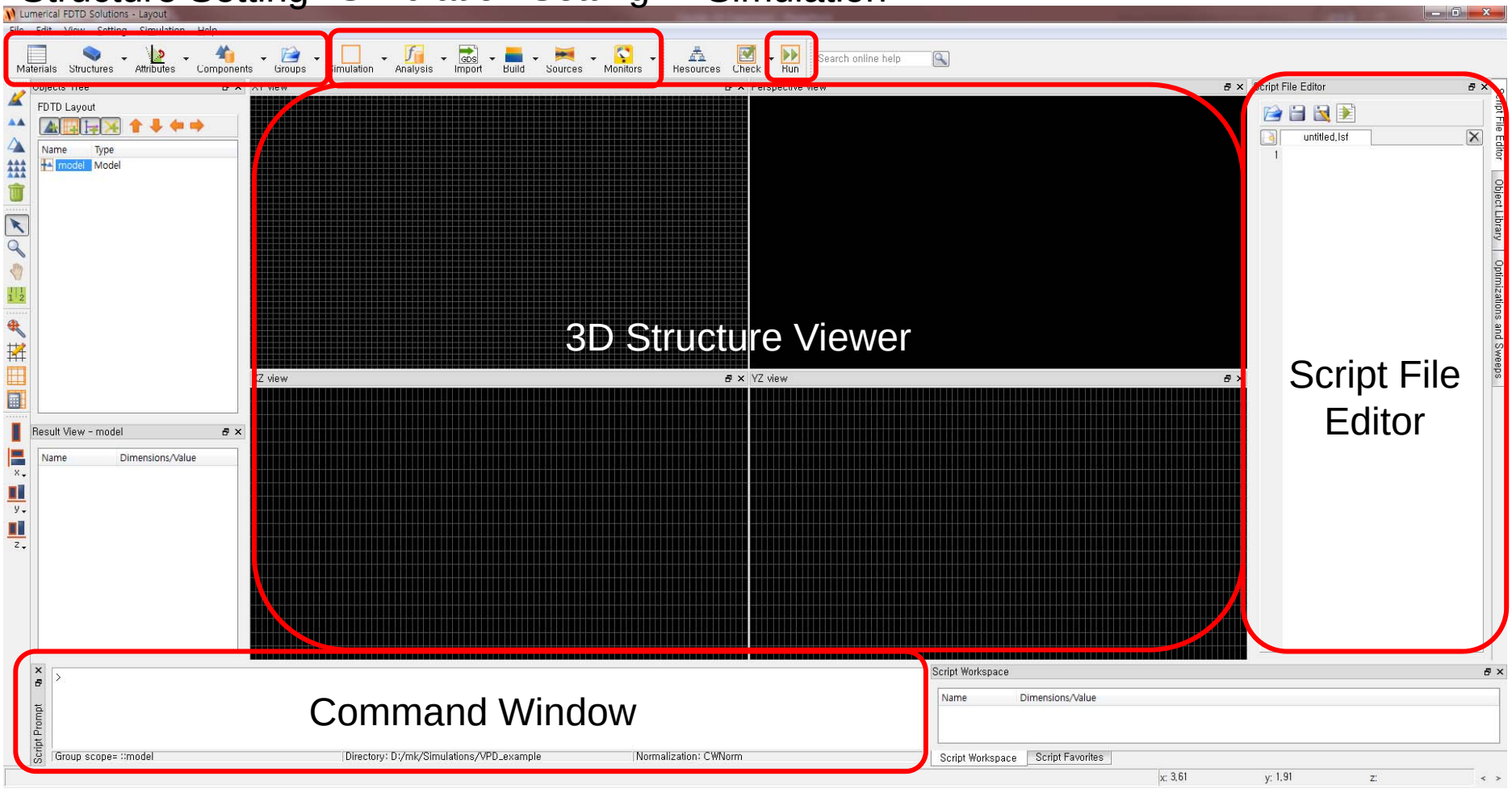
Need official E-mail(Ex: @yonsei.ac.kr) for download

License Setting

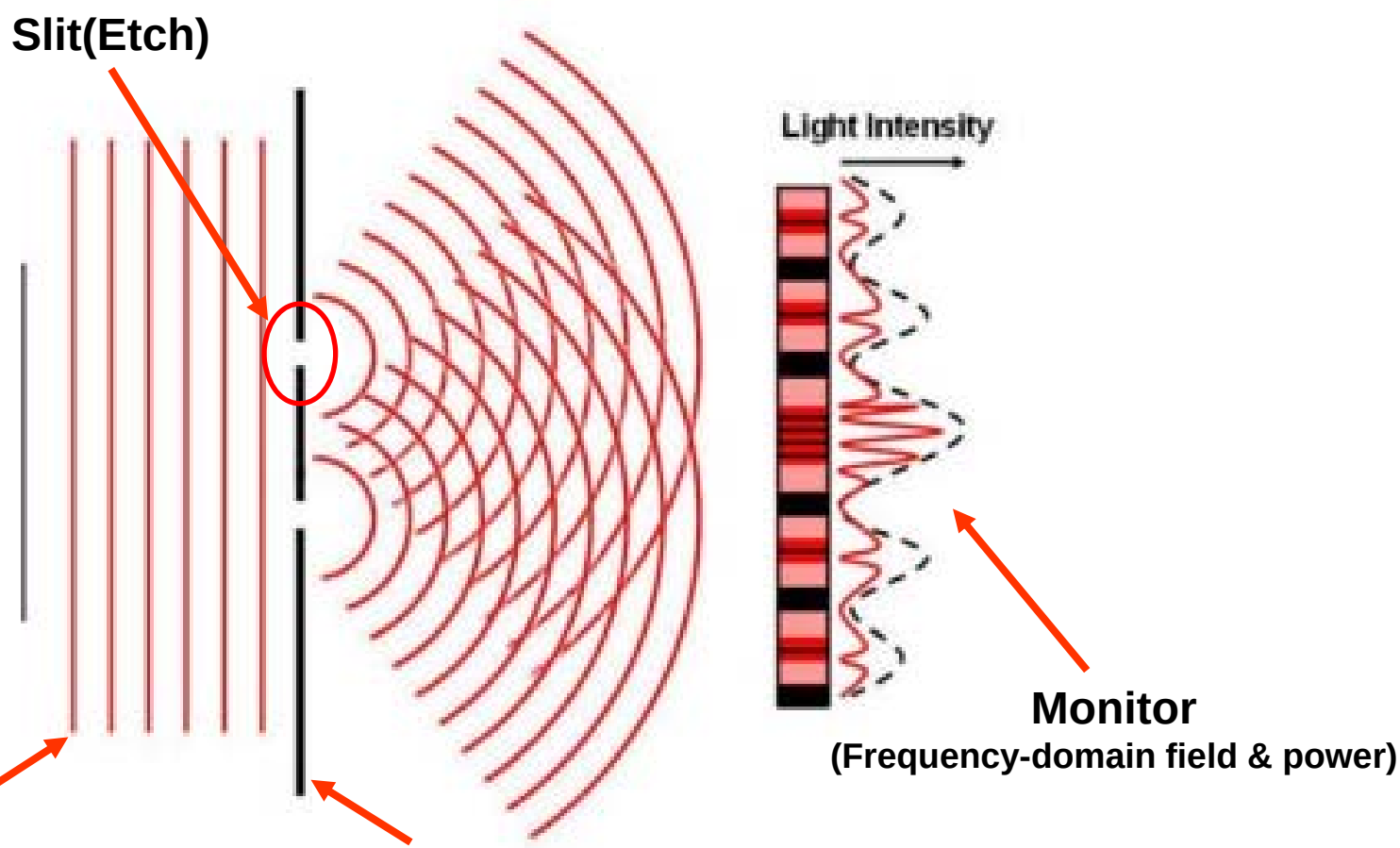


FDTD Window

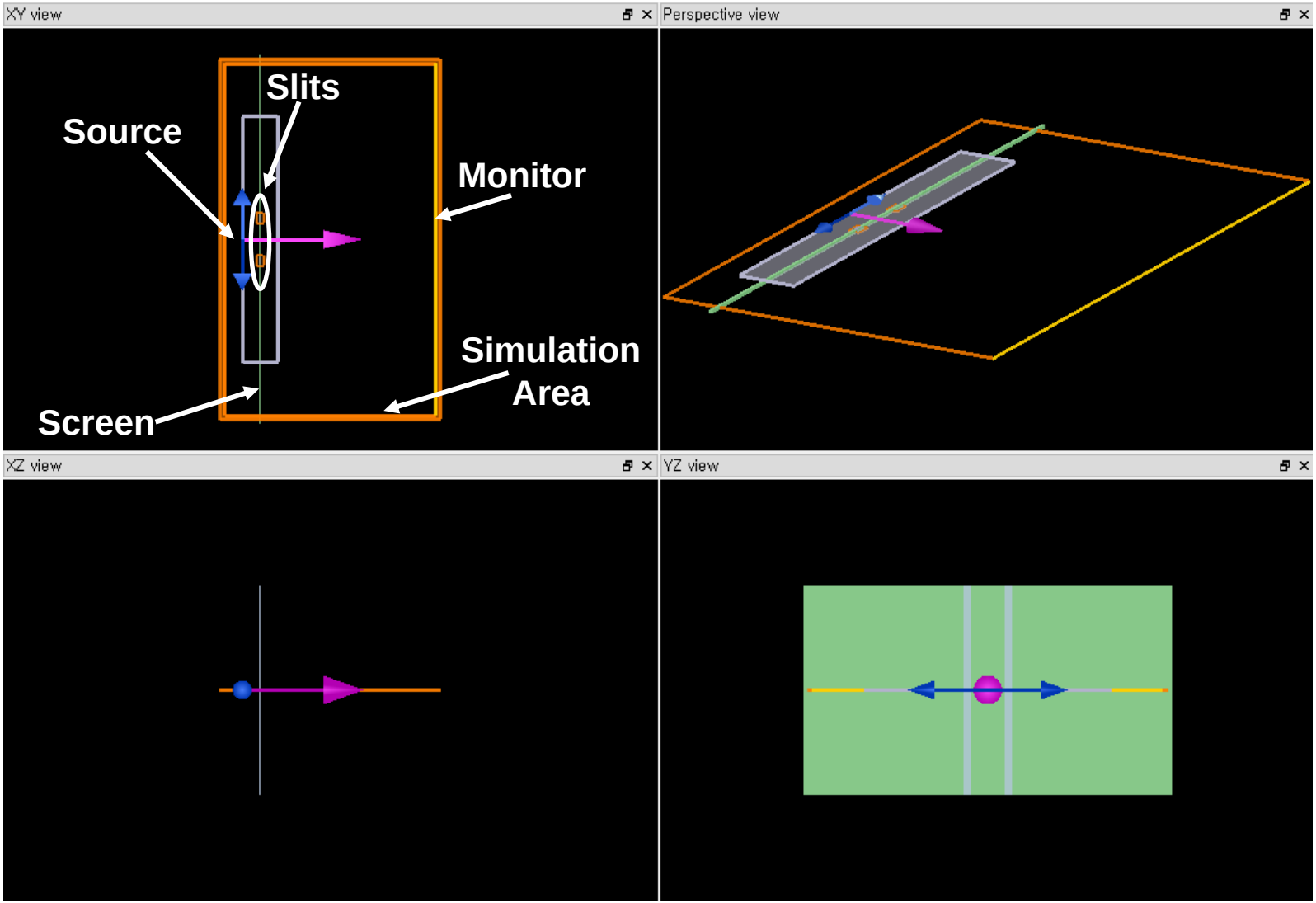
Structure Setting Simulation Setting Simulation



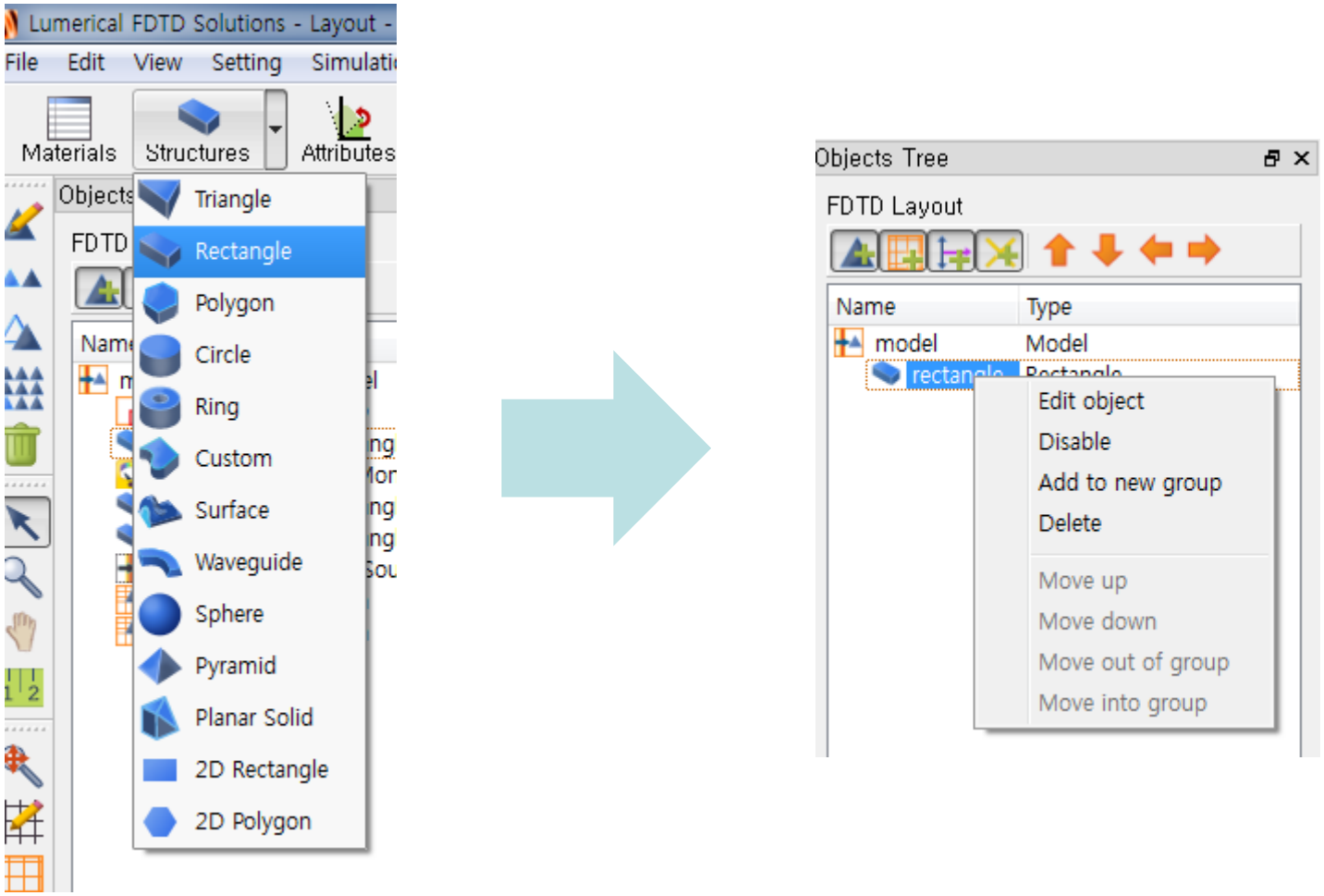
Double Slit Experiment



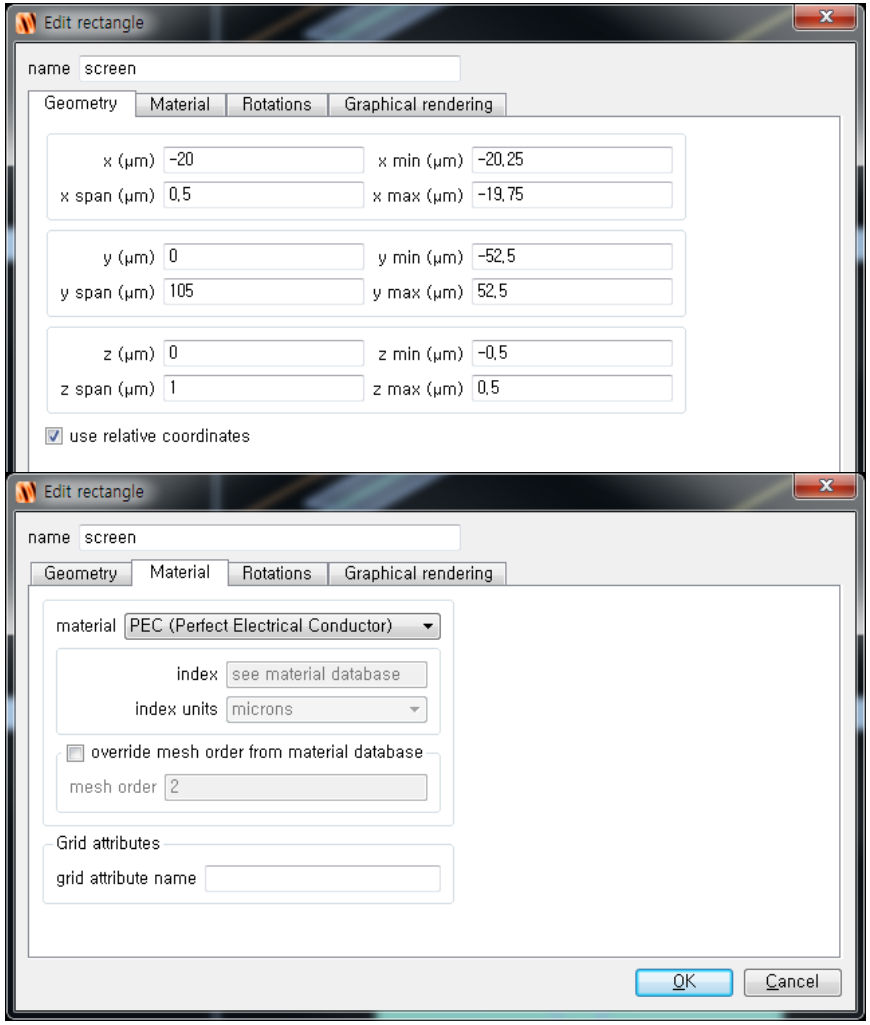
Simulation Setup



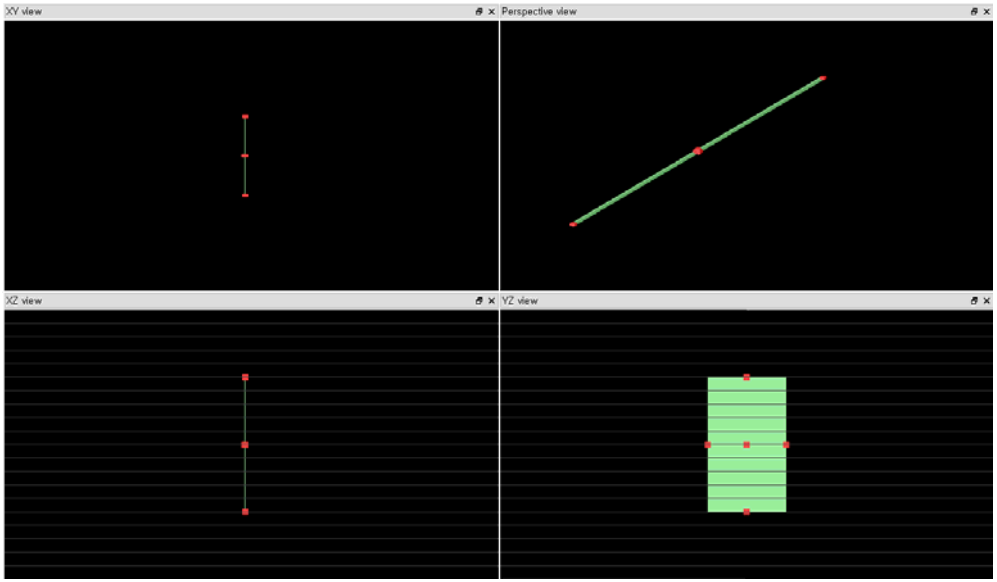
Build Screen



Build Screen

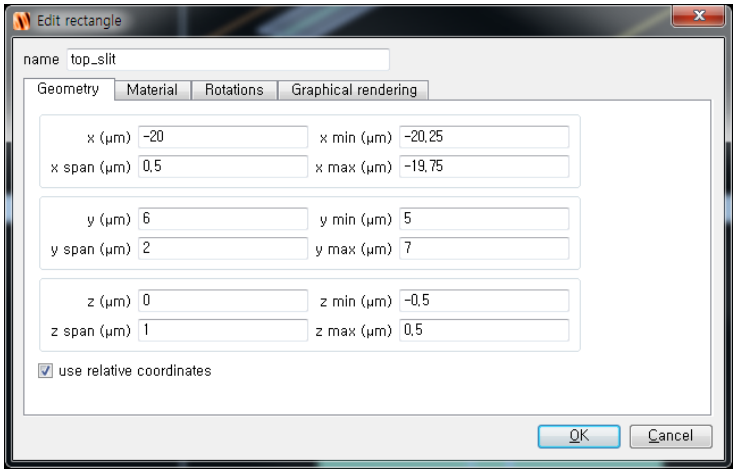


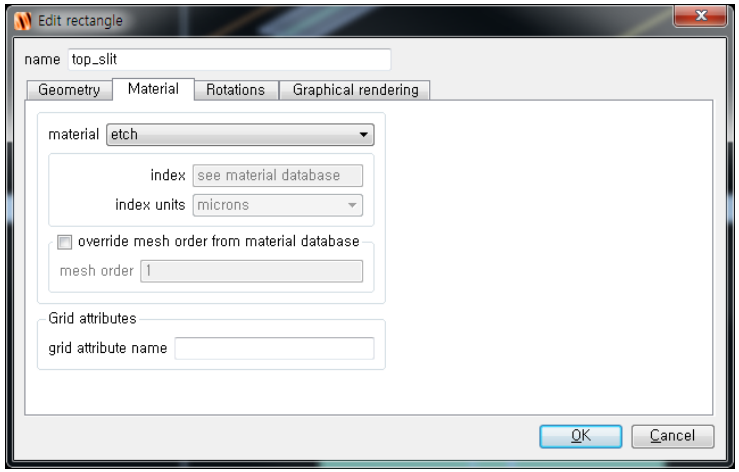
You can use both (x & span)
or (x min & max) for setup



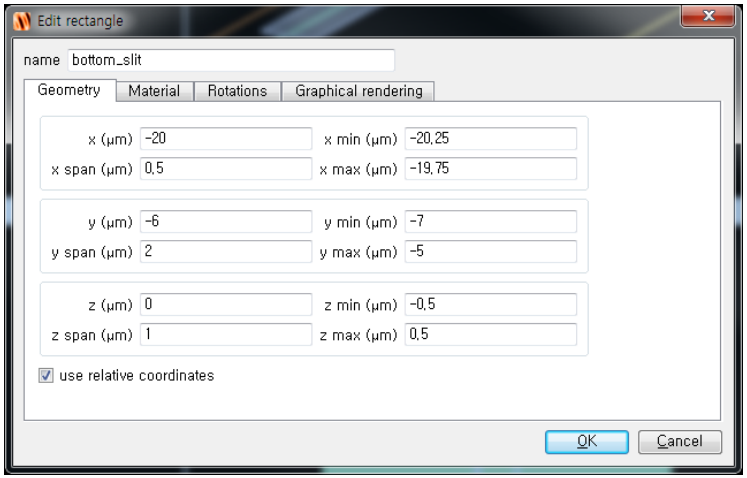
Build Slits

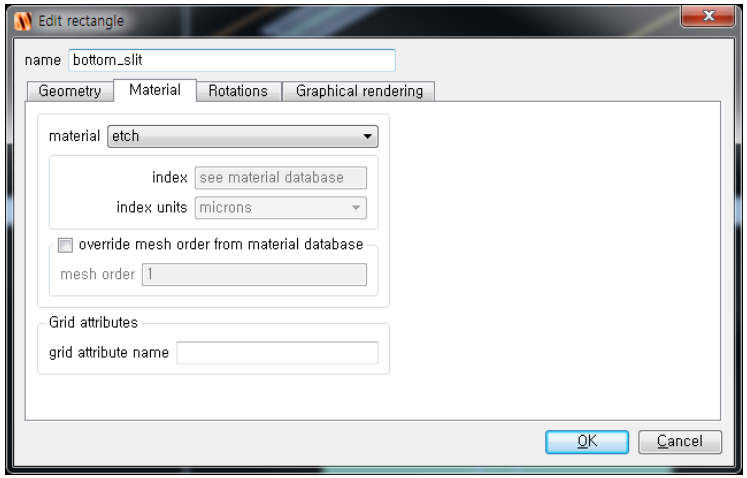
- **Upper slit**



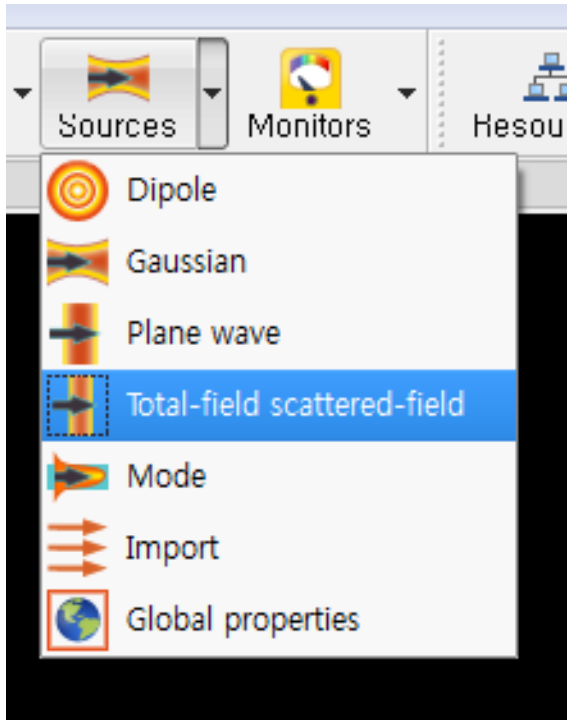


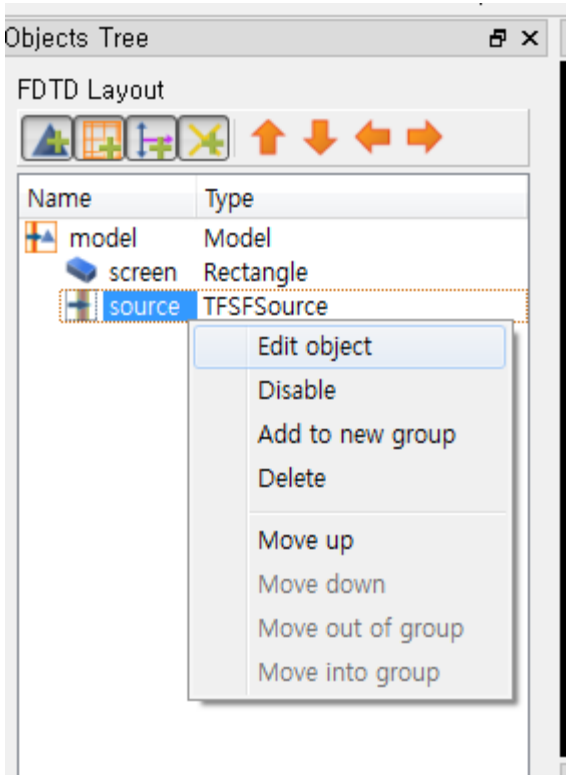
- **Lower slit**





Source Setup





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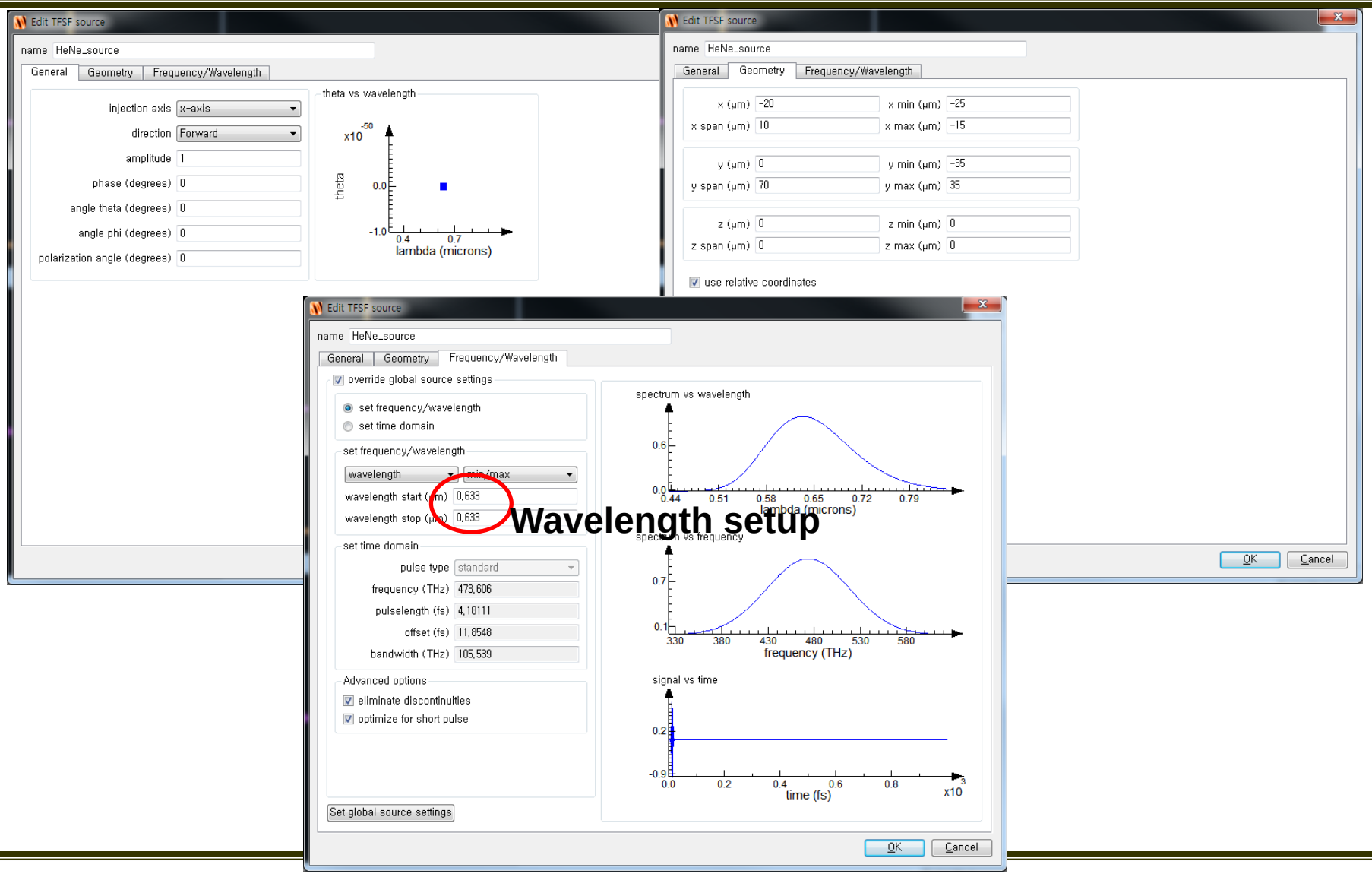
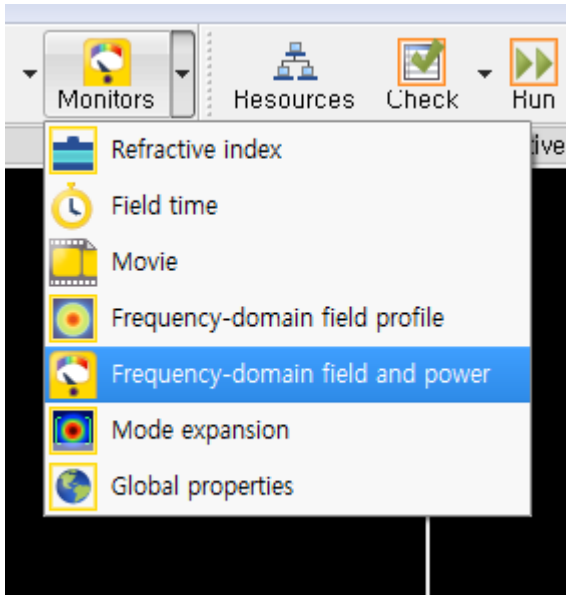
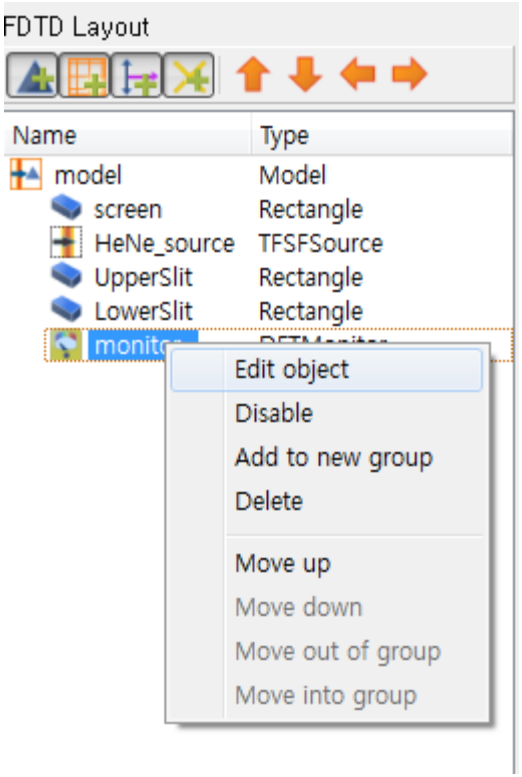
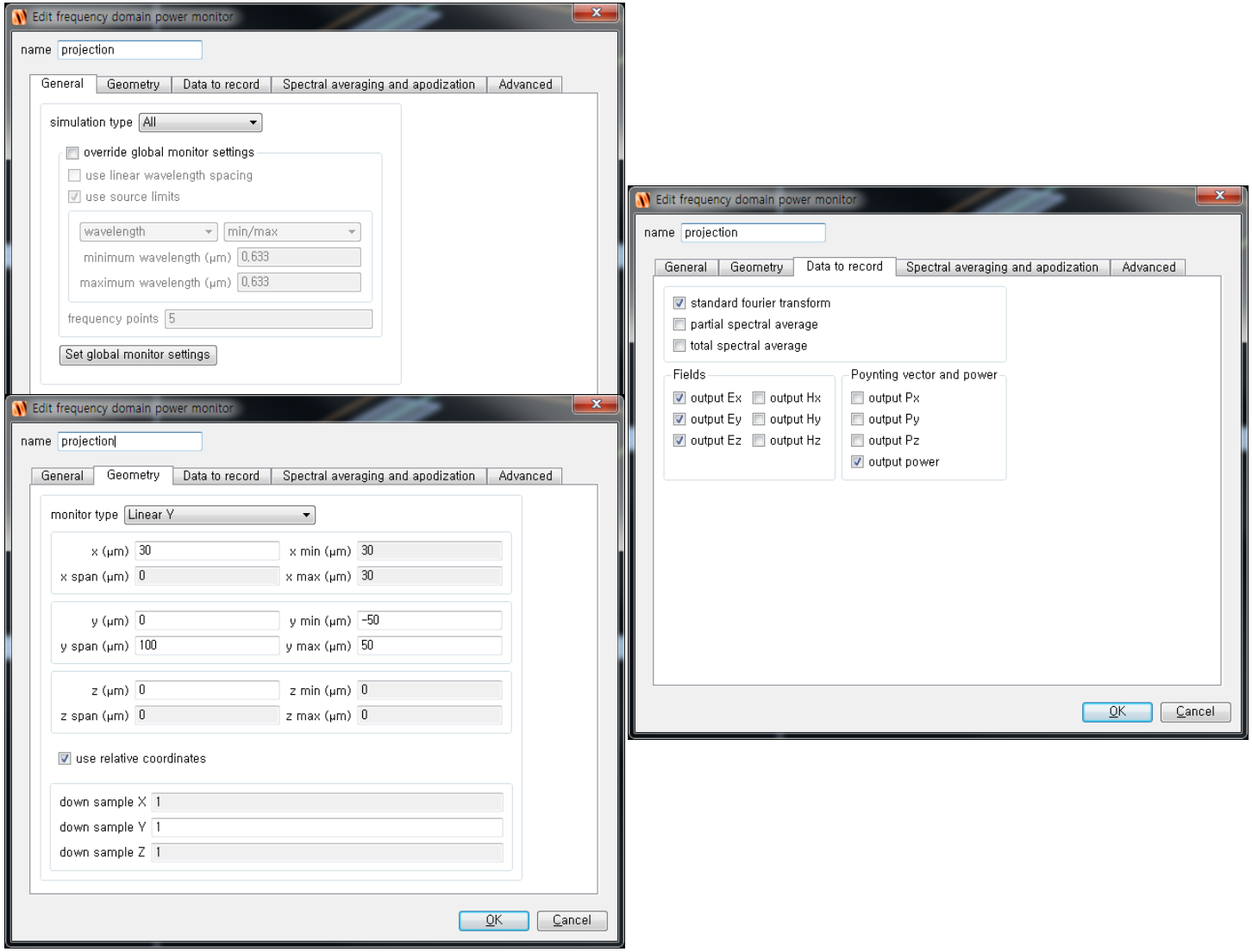


Monitor Setup

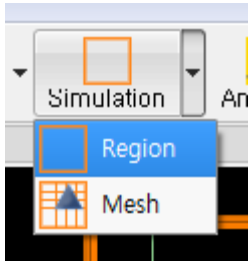


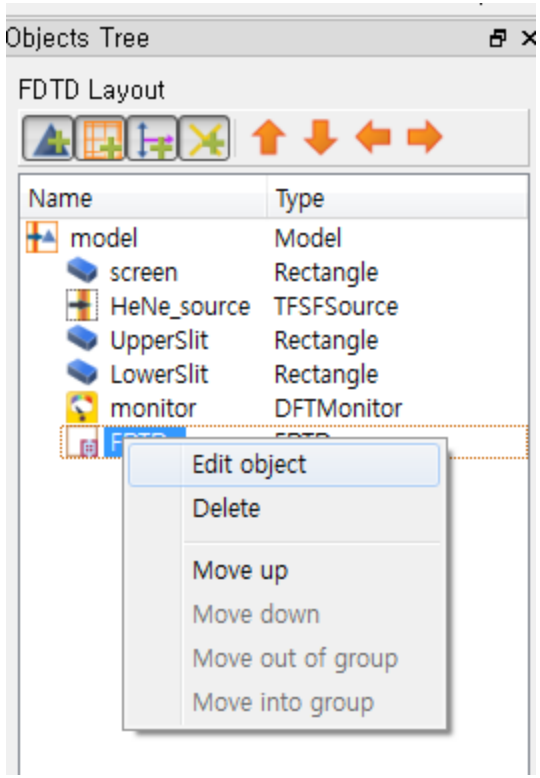


Monitor Setup

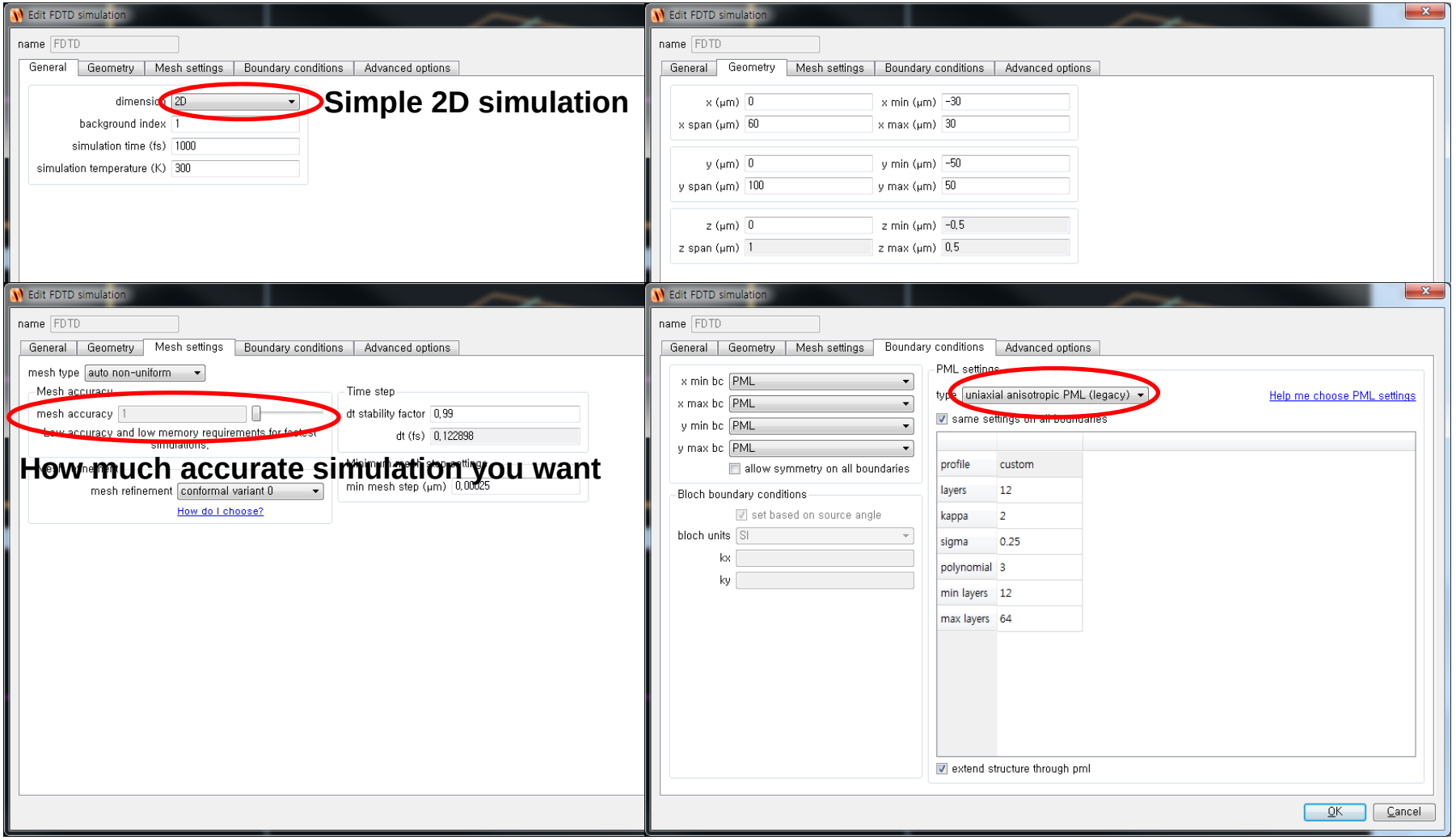


Simulation Setup



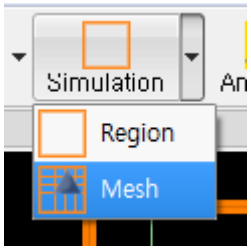


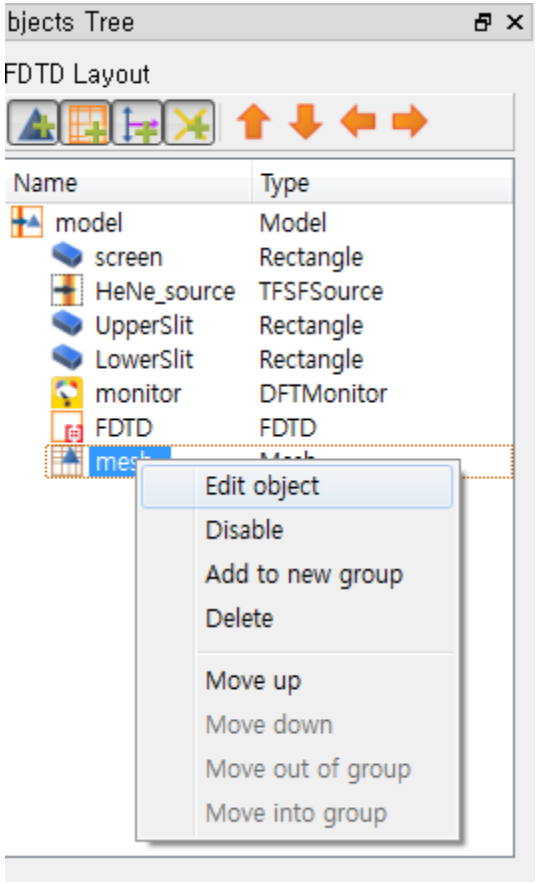
Simulation Setup



Simulation Setup(Mesh)

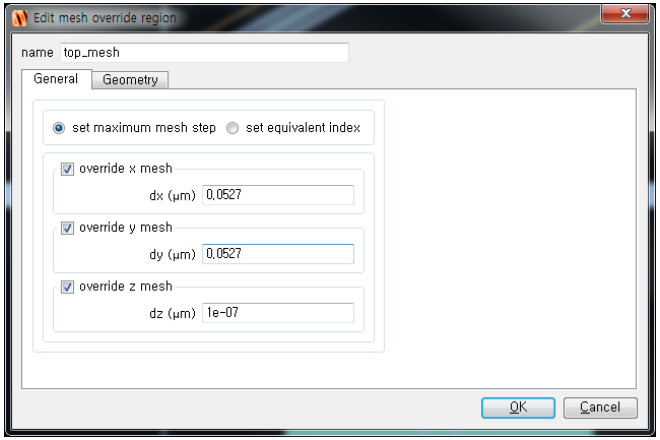
- **Accurate simulation is required in slits!**
  ➔Mesh setup

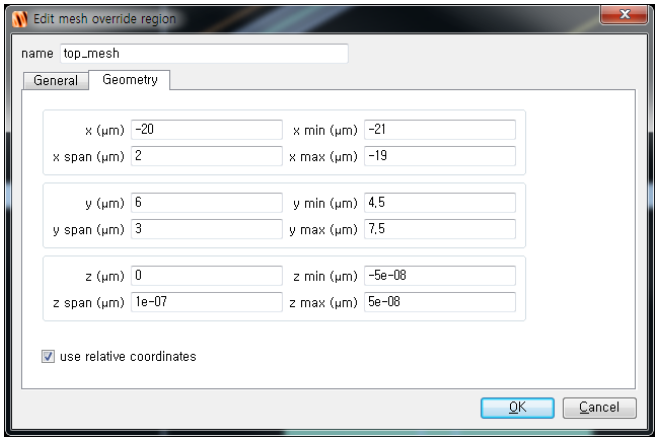




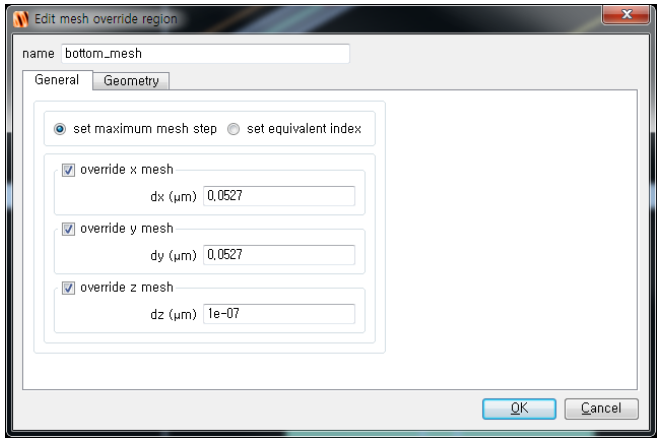
Simulation Setup(Mesh)

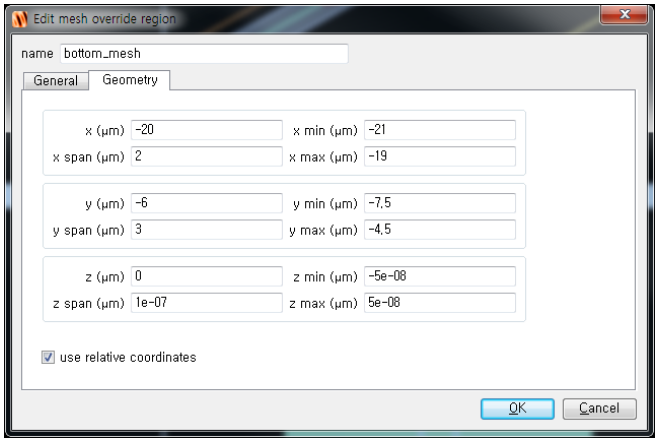
- **Upper slit**



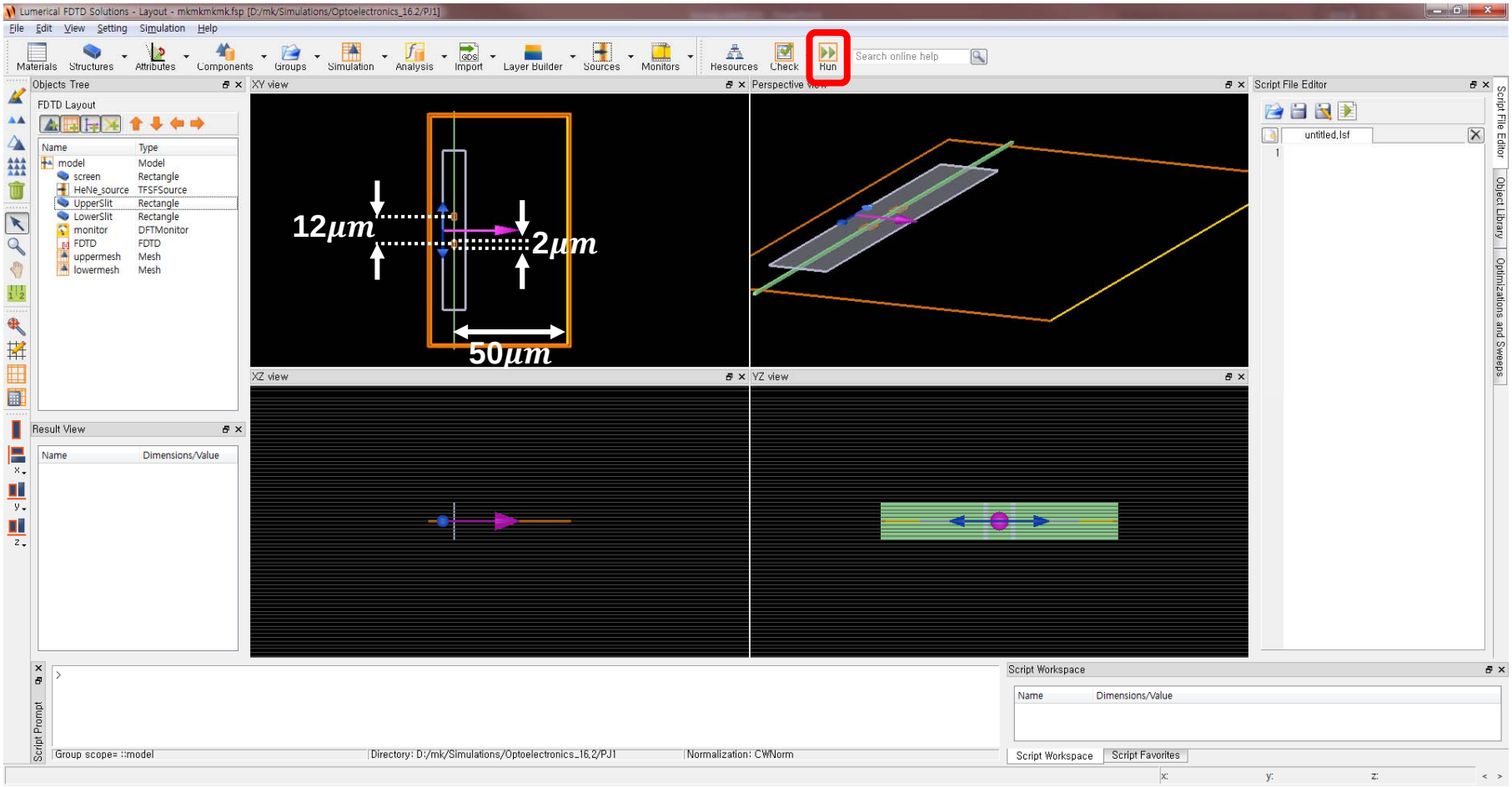


- **Lower slit**





Simulation


Lumerical FDTD Solutions - Layout - mkmkmkmk.fsp [D:/mk/Simulations/Optoelectronics_16.2/PJ1]
File Edit View Setting Simulation Help
Materials Structures Attributes Components Groups Simulation Analysis Import Layer Builder Sources Monitors Resources Check Run
Search online help
Objects Tree
FDTD Layout
Name Type
model Model
screen Rectangle
HeNe_source TFSFSource
UpperSlit Rectangle
LowerSlit Rectangle
monitor DFTMonitor
FDTD FDTD
uppermesh Mesh
lowermesh Mesh
XY view
12μm
2μm
50μm
Perspective view
Script File Editor
untitled.lsf
XZ view
YZ view
Result View
Name Dimensions/Value
Script Prompt
Script Workspace
Name Dimensions/Value
Script Workspace Script Favorites
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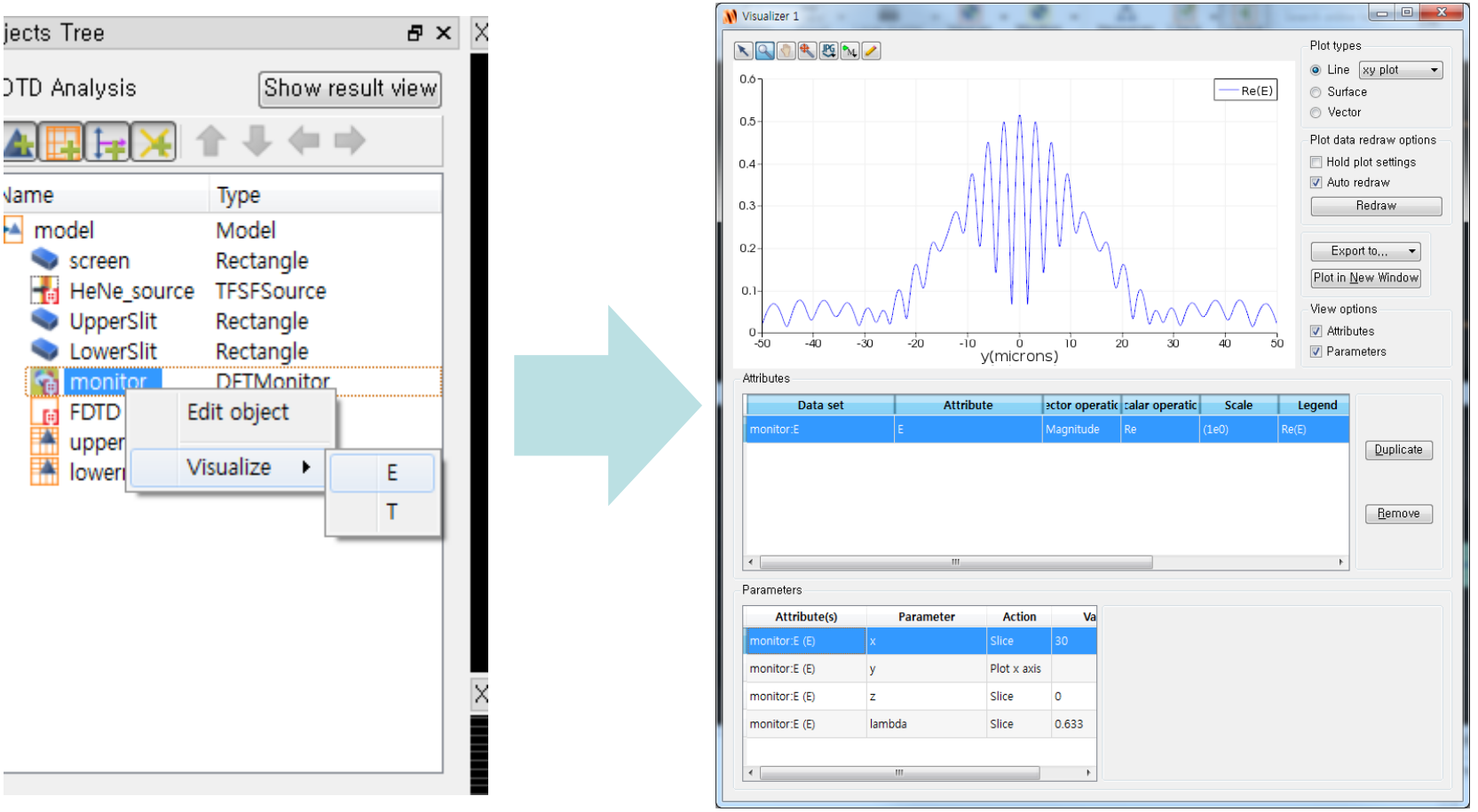
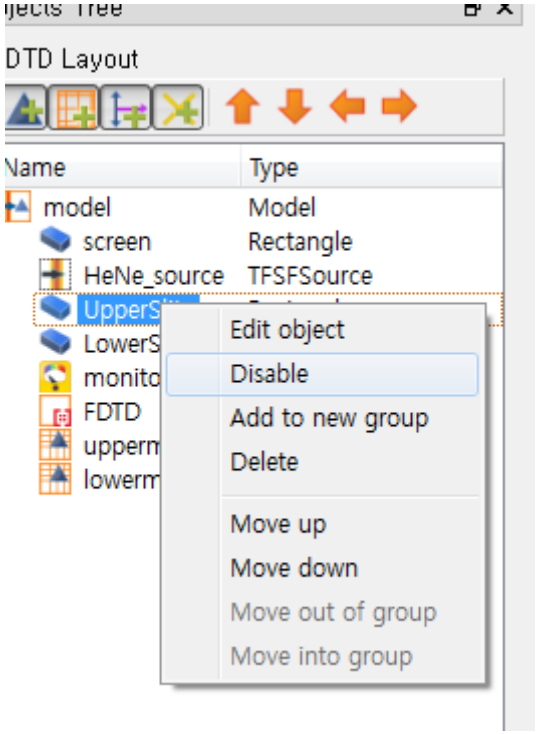
Normalization: CWNorm
Object Library
Optimizations and Sweeps

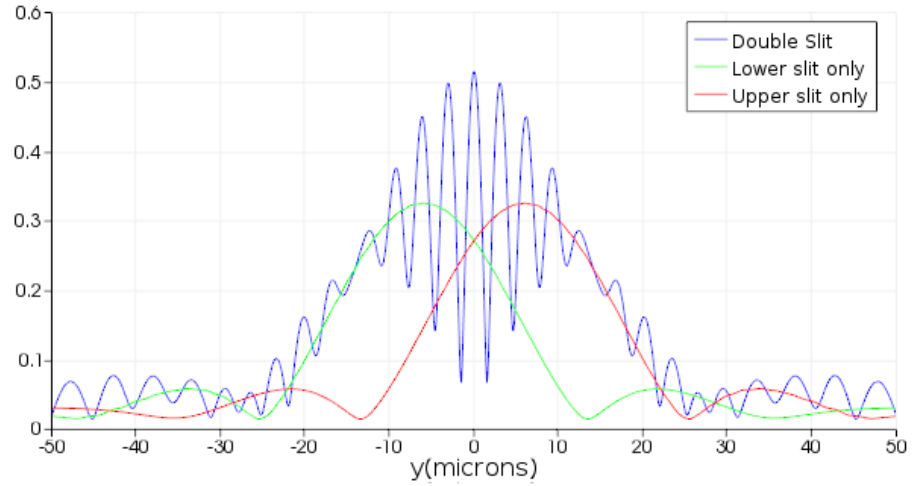
Simulation Result



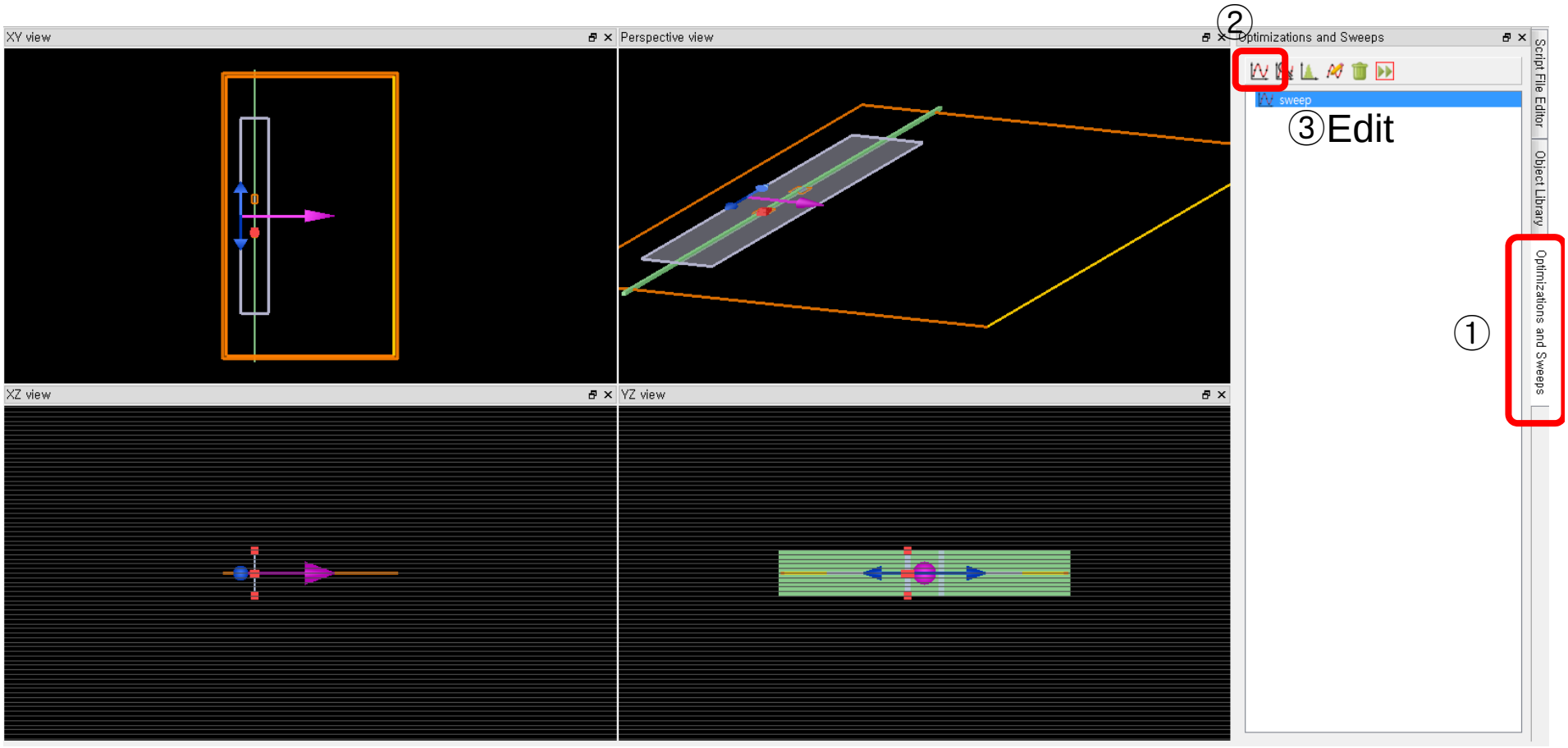
Single Slit Experiments

- **Disable one of slits ➔ single slit experiment**



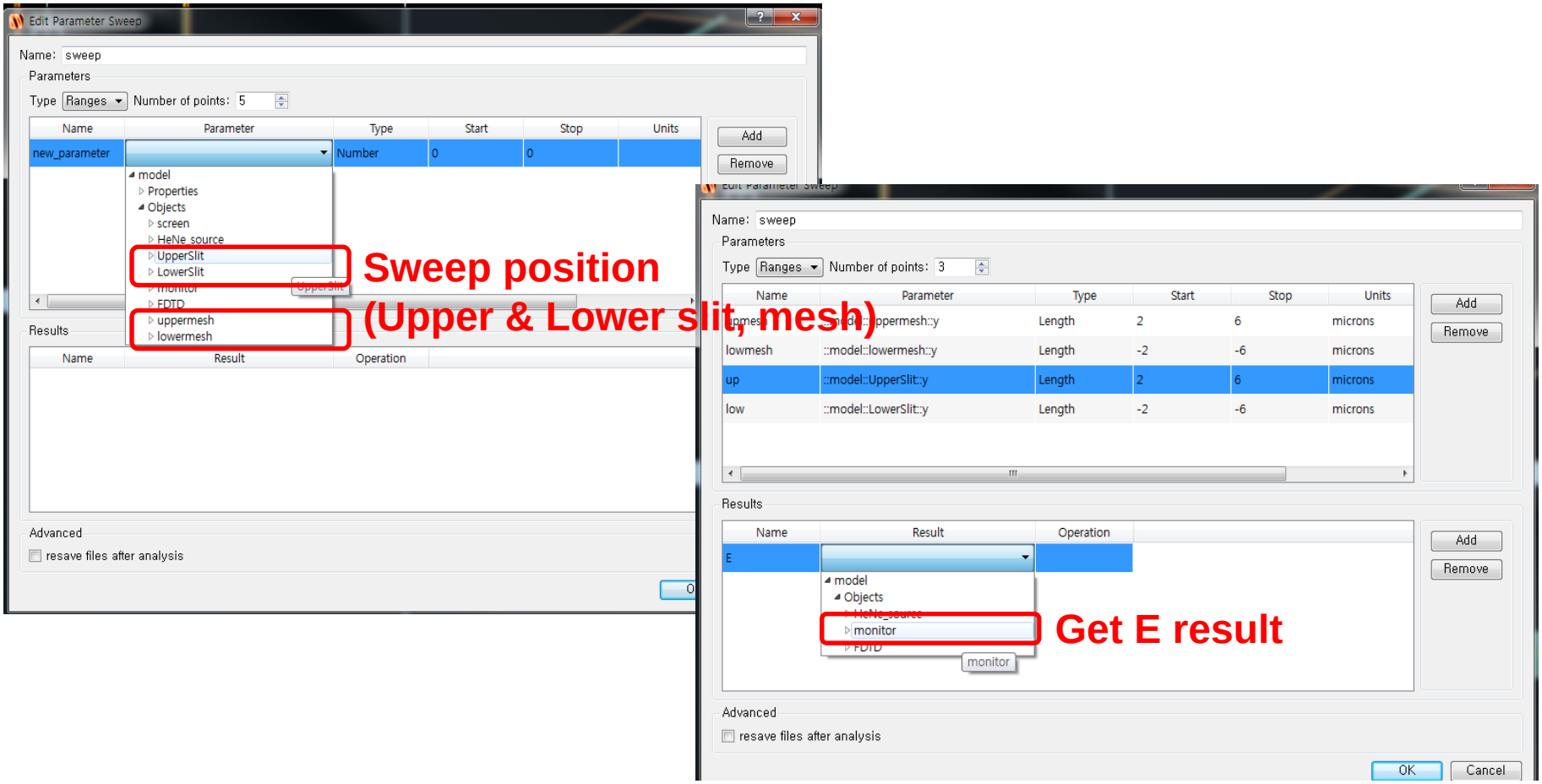


Sweep Simulation



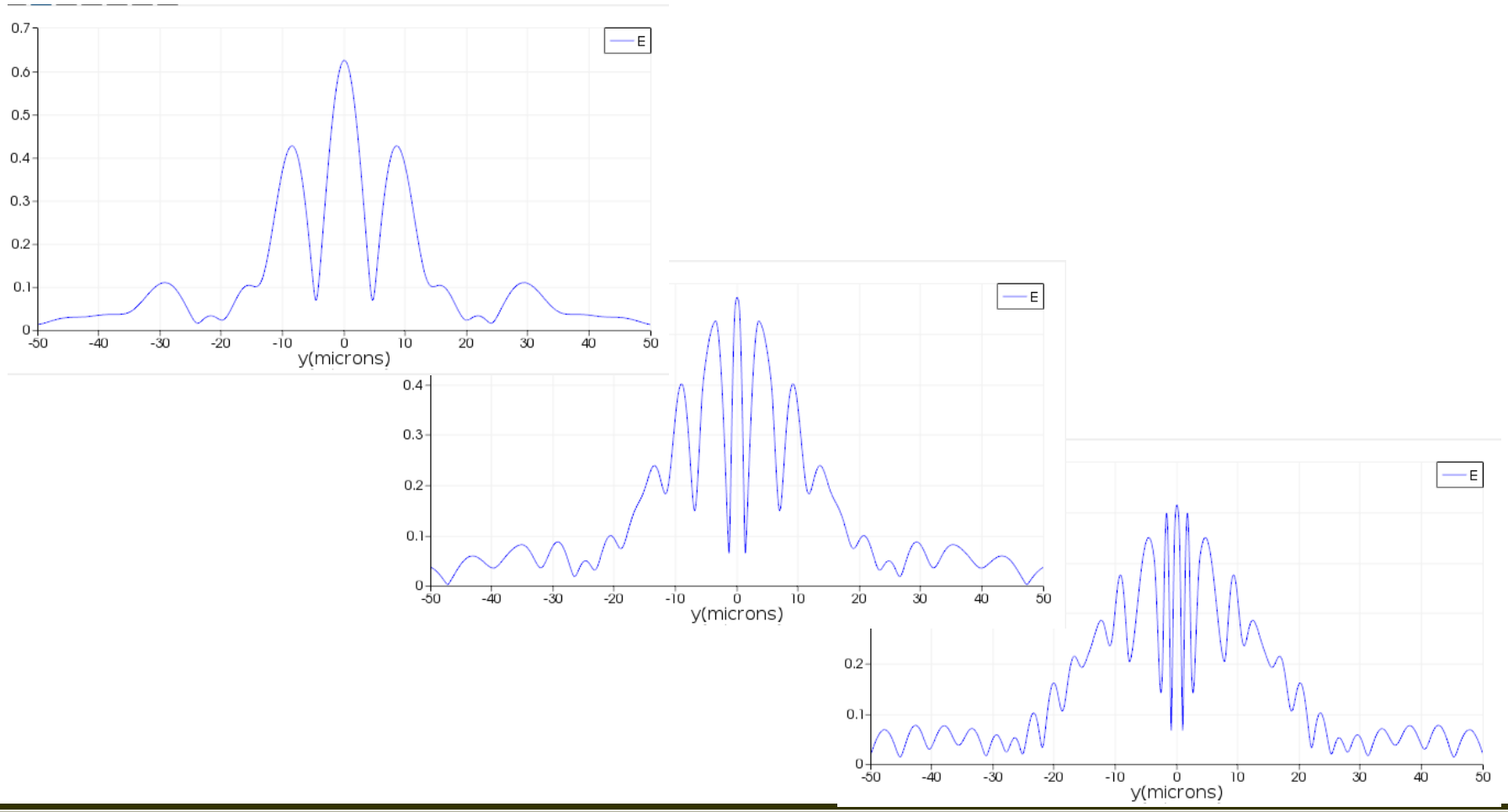
Slit Distance Sweep

- **Sweep slit distance 4, 8, 12 μm**



Simulation Result

- **4 μm, 8 μm, 12 μm**



Design Exercise

- Sweep slit width(1, 1.5, 2 μm) and simulate both single slit and double slit experiment.
  (Distance between two slits: 12 μm, Distance from slit to monitor: 50 μm)

- Sweep distance from slit to monitor(10, 30, 50 μm) and simulate both single and double slit experiment.
  (Distance between two slits: 12 μm, Slit width: 2 μm)

- Show the results respectively, and compare & analyze the results.

- Due: 10/30 in class(Hard copy)