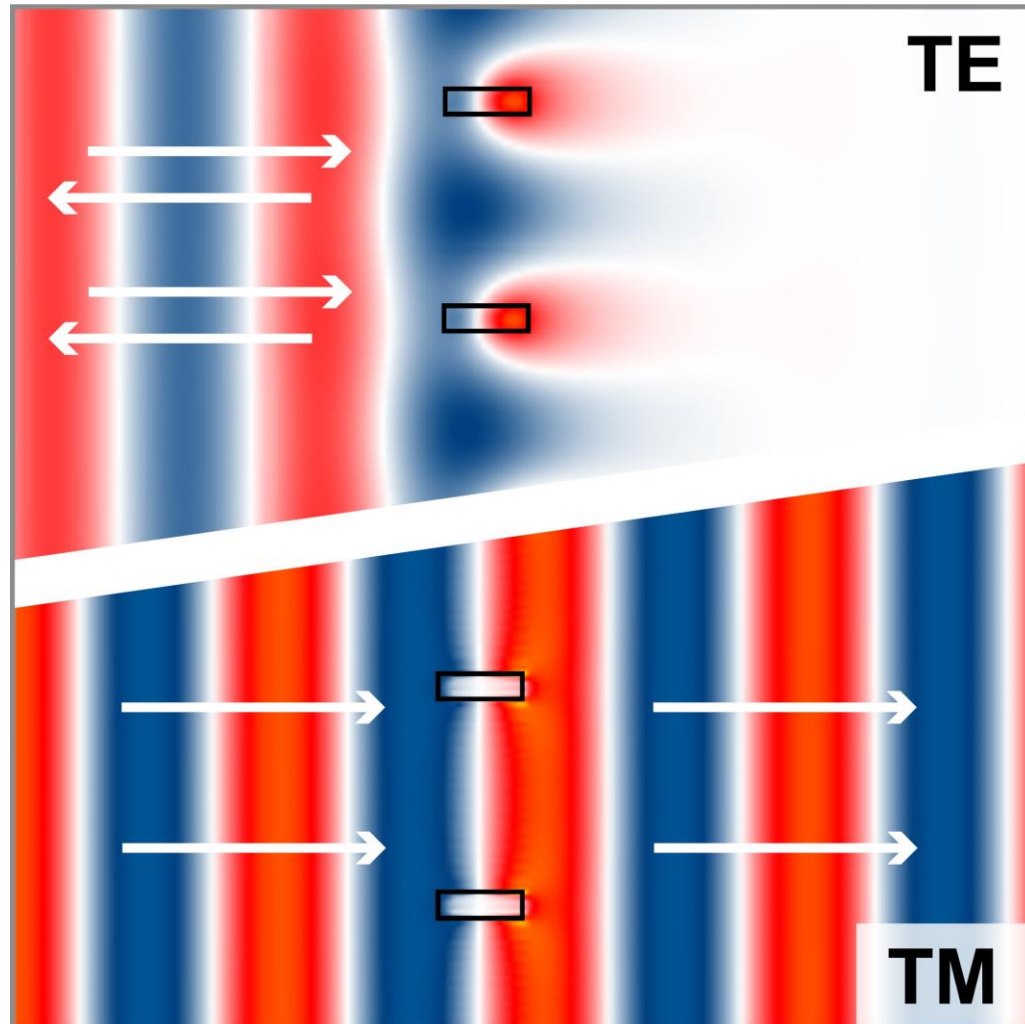


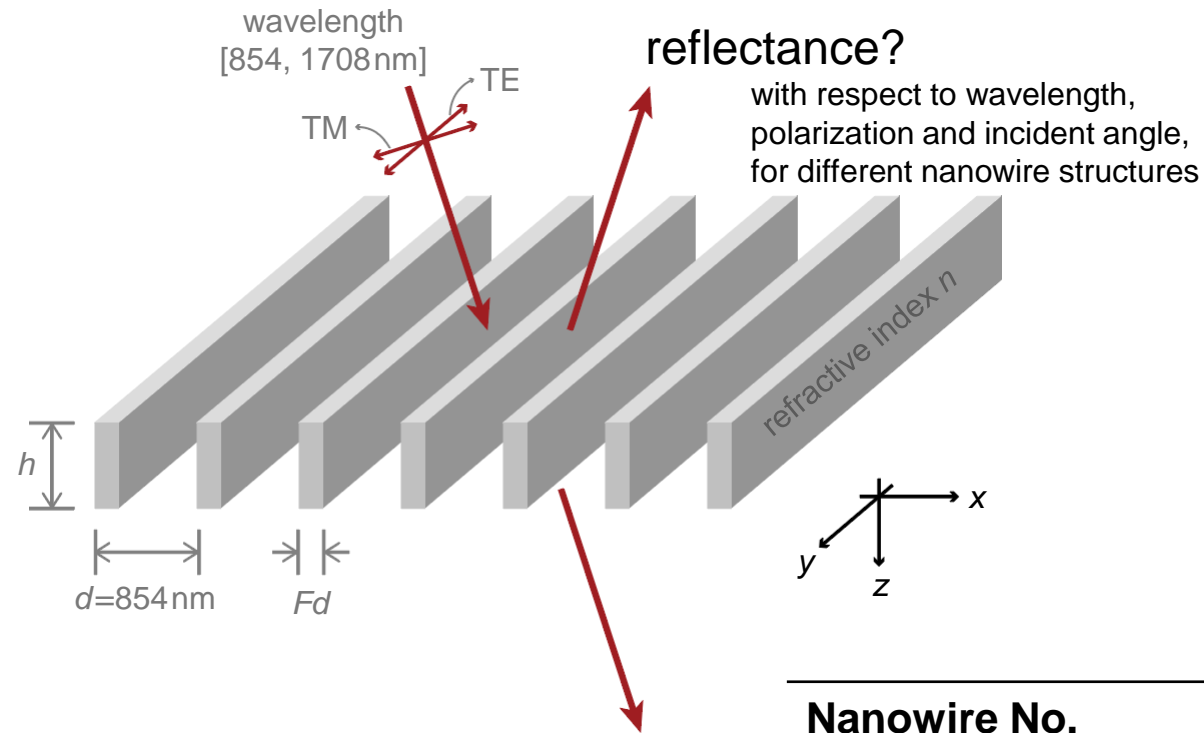
# Ultra-Sparse Dielectric Nano-Wire Grid Polarizers

# Abstract



Ultra-sparse dielectric nanowire grids show strongly polarization-dependent properties and they can be employed as wideband reflectors [J. W. Yoon *et al.*, *Opt. Express* **23**, 28849-28856 (2015)]. The polarization-, wavelength-, and angle-dependent properties of selected nanowire grids are investigated by using the Fourier modal method (FMM, also known as RCWA). Visualization of the interaction between electric field and the nanowire grids are presented.

# Modeling Task

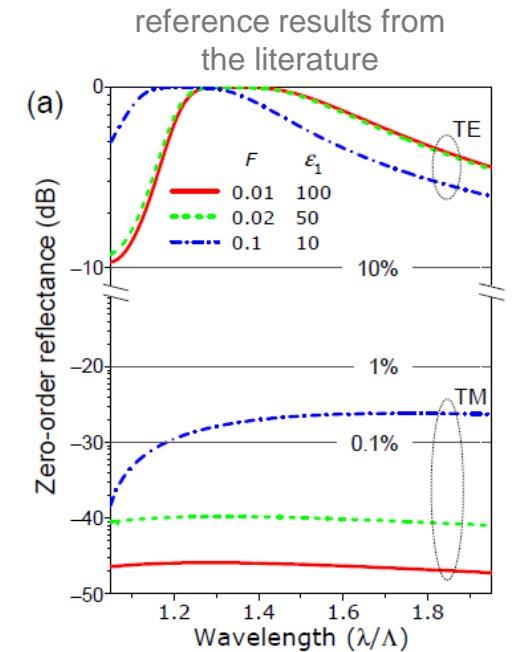
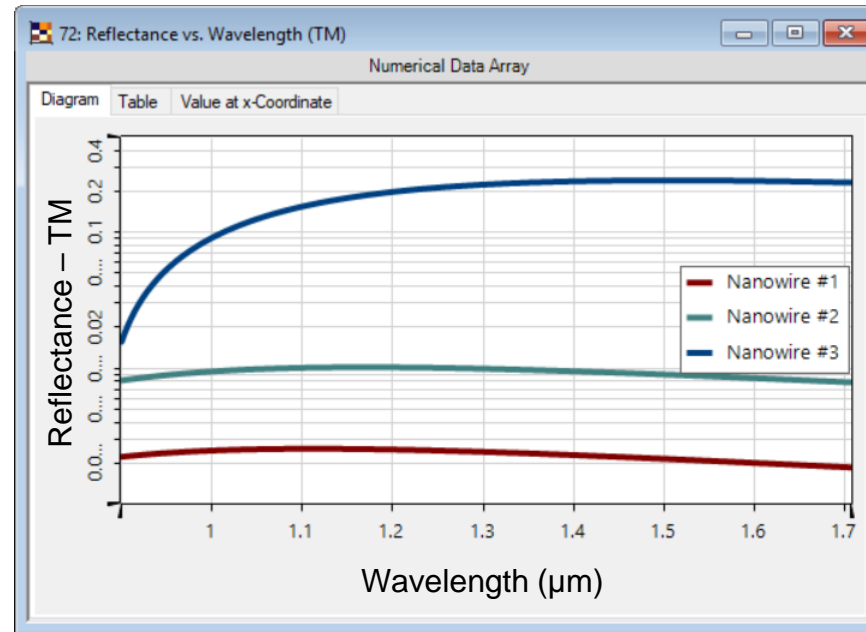
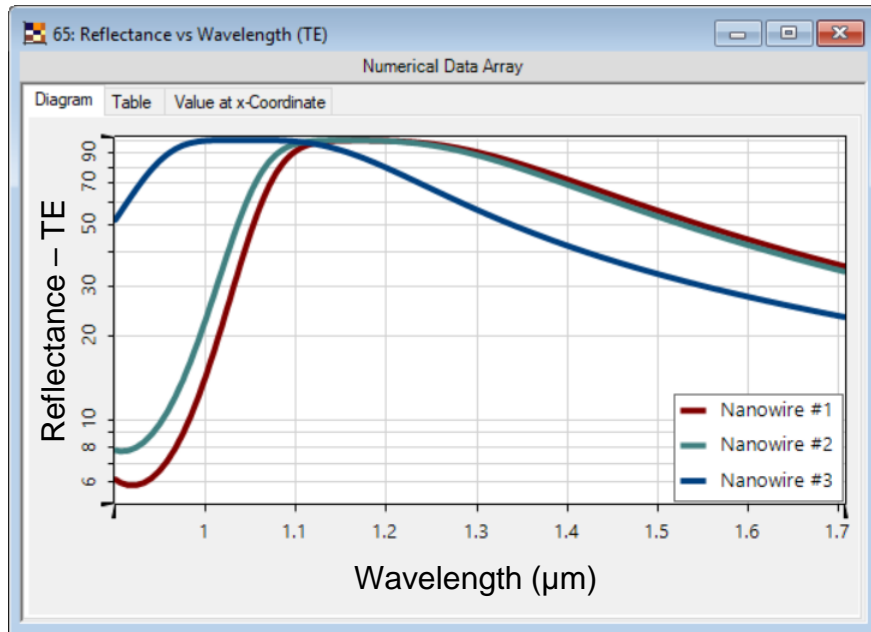


Nanowire No.	#1	#2	#3
refractive index $n$	10	7.07	3.16
height $h$	269nm	270nm	292nm
filling factor $F$	0.01	0.02	0.1

Parameters are taken from reference paper: J. W. Yoon *et al.*, Opt. Express **23**, 28849-28856 (2015).

# Parameter Scanning (1D)

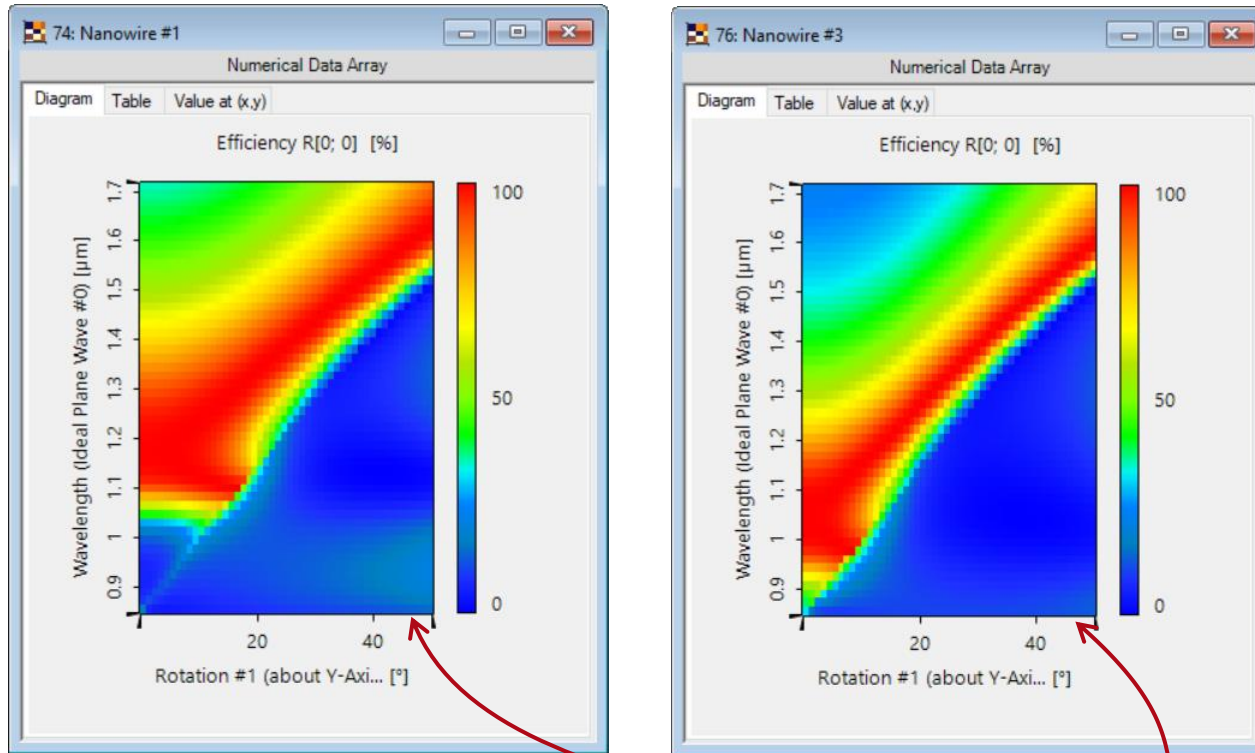
Fourier modal method (FMM) simulation in VirtualLab Fusion



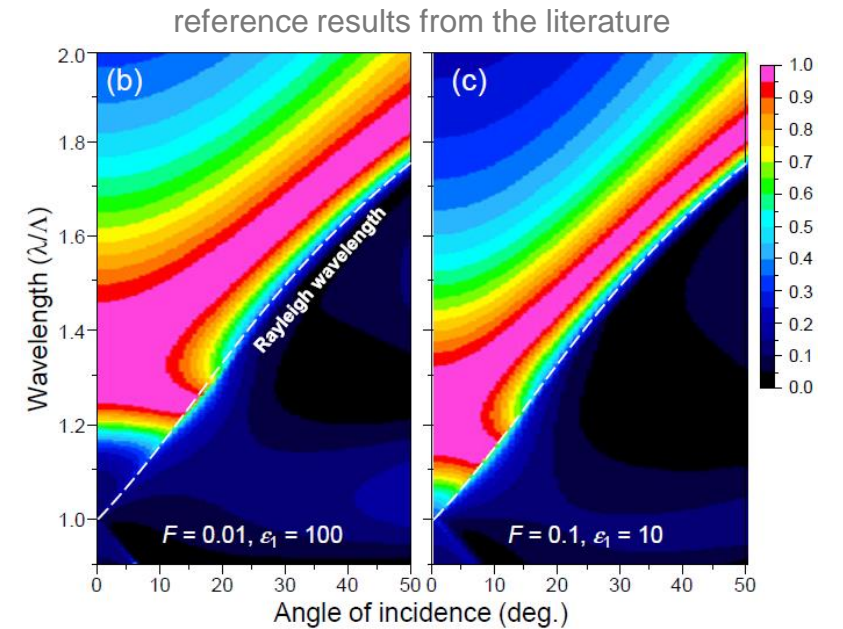
Nanowire No.	#1 —	#2 —	#3 —
refractive index $n$	10	7.07	3.16
height $h$	269nm	270nm	292nm
filling factor $F$	0.01	0.02	0.1

# Parameter Scanning (2D)

Fourier modal method (FMM) simulation in VirtualLab Fusion, for TE polarization

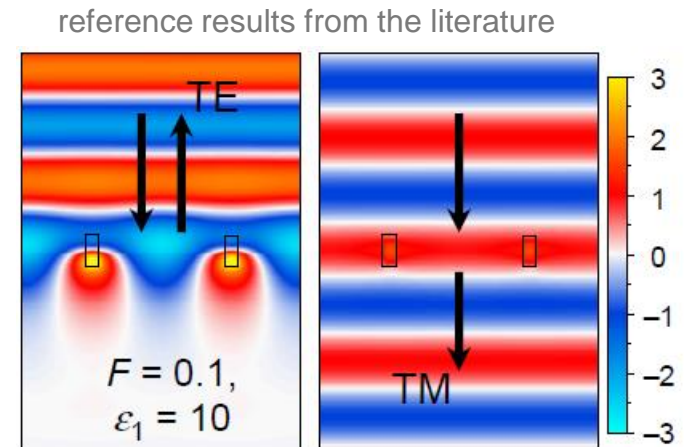
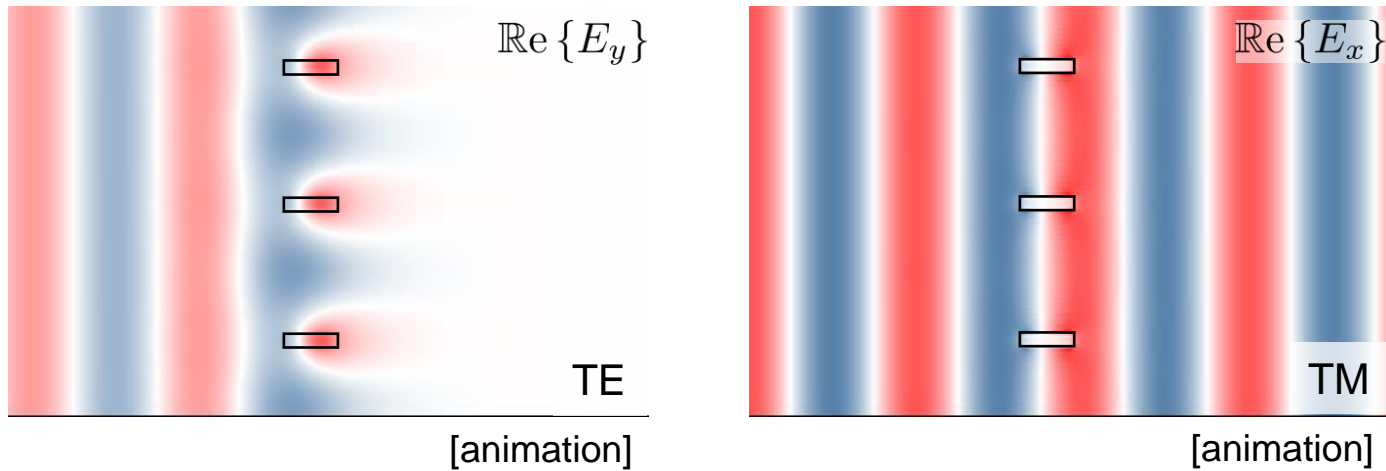


Nanowire No.	#1	#2	#3
refractive index $n$	10	7.07	3.16
height $h$	269nm	270nm	292nm
filling factor $F$	0.01	0.02	0.1



# Visualization of Field Inside Grating

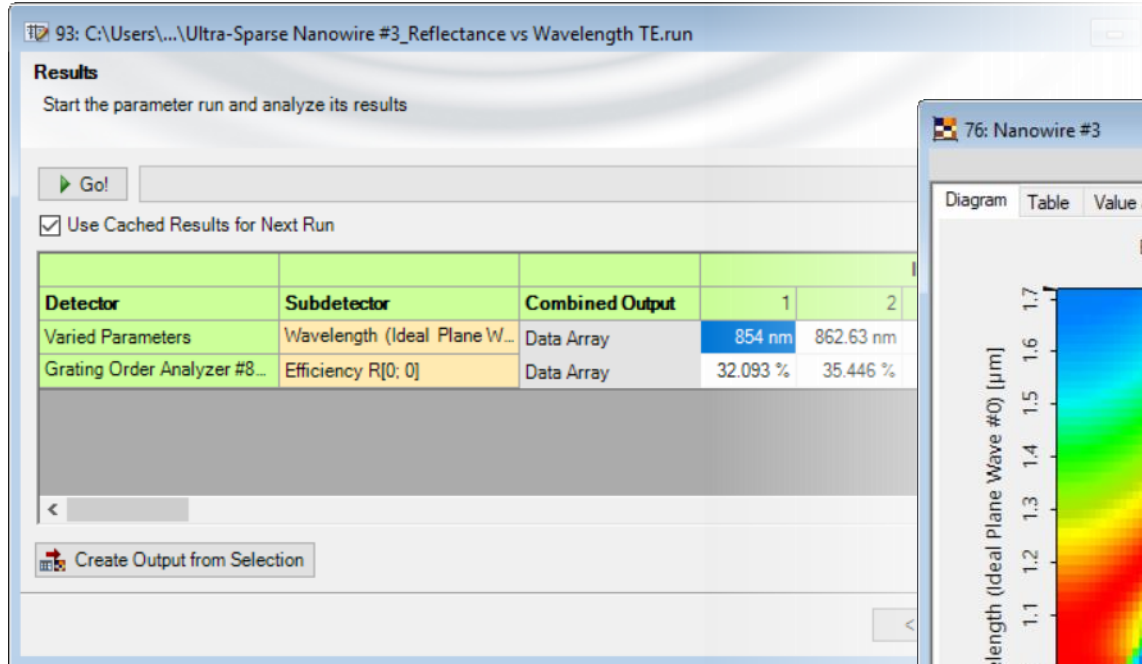
Fourier modal method (FMM) simulation in VirtualLab Fusion @1045nm



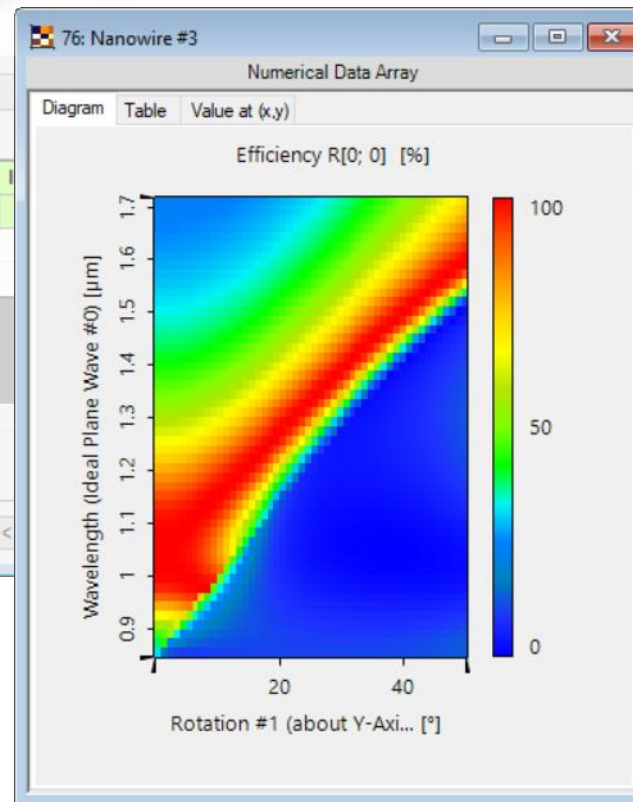
Nanowire No.	#1	#2	#3
refractive index $n$	10	7.07	3.16
height $h$	269nm	270nm	292nm
filling factor $F$	0.01	0.02	0.1

# Peek into VirtualLab Fusion

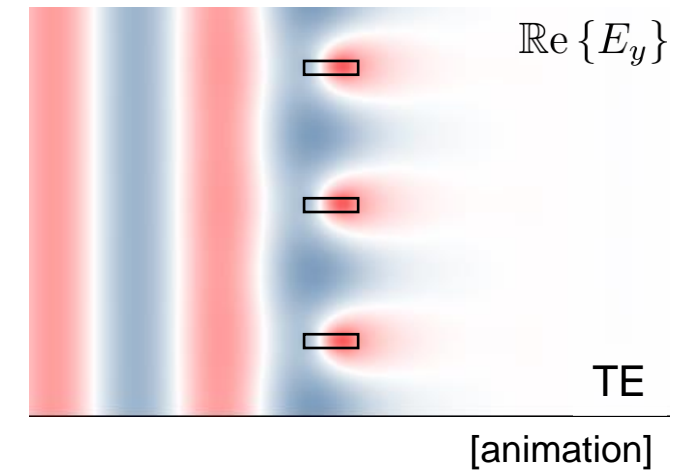
analysis of diffraction efficiency vs. specific parameter(s)



two-dimensional diffraction efficiency analysis

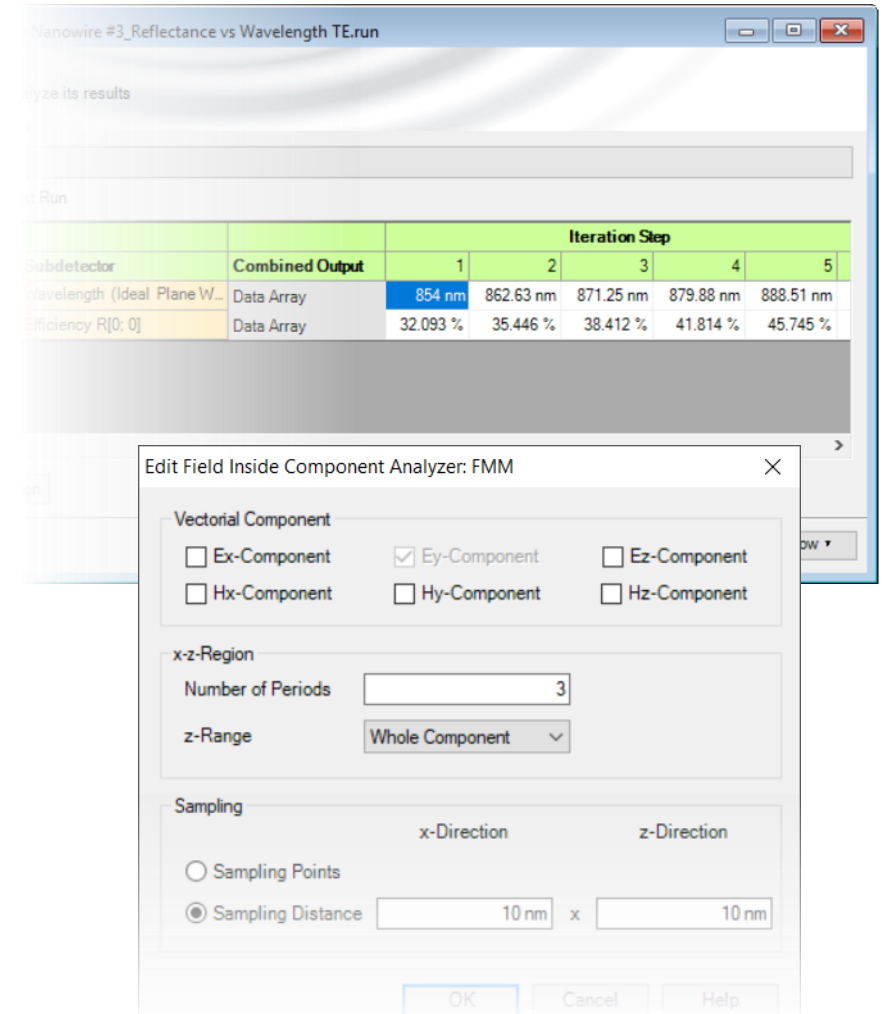


visualization of field inside grating



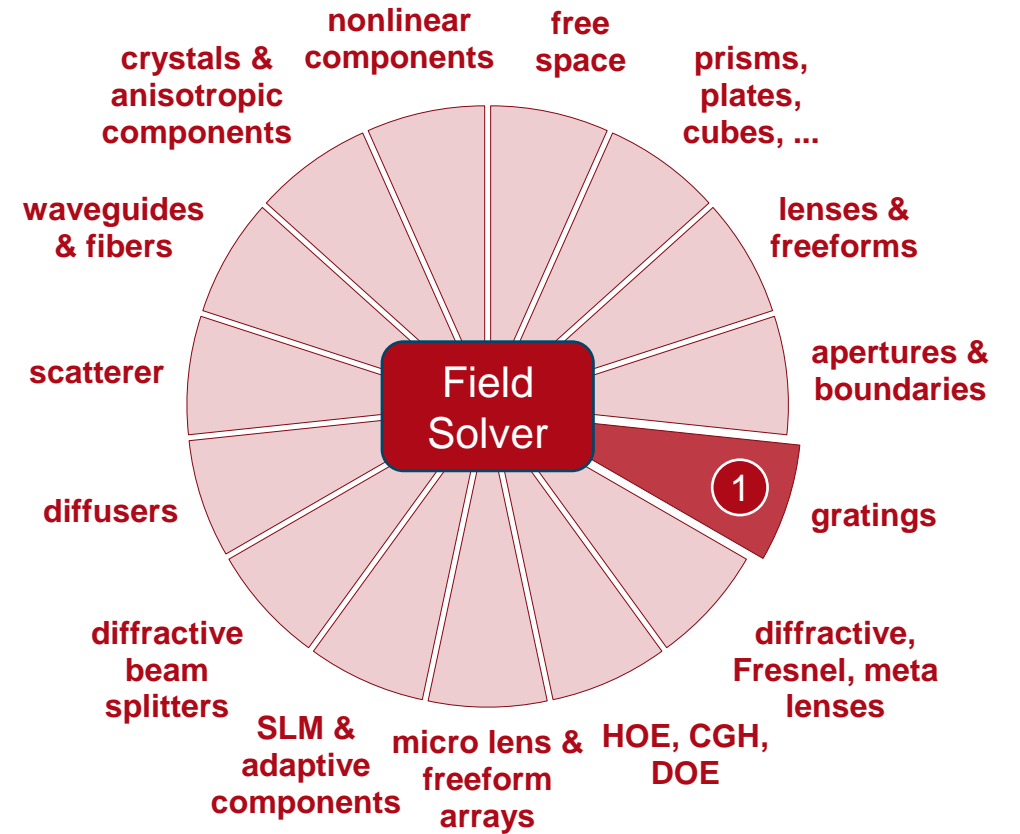
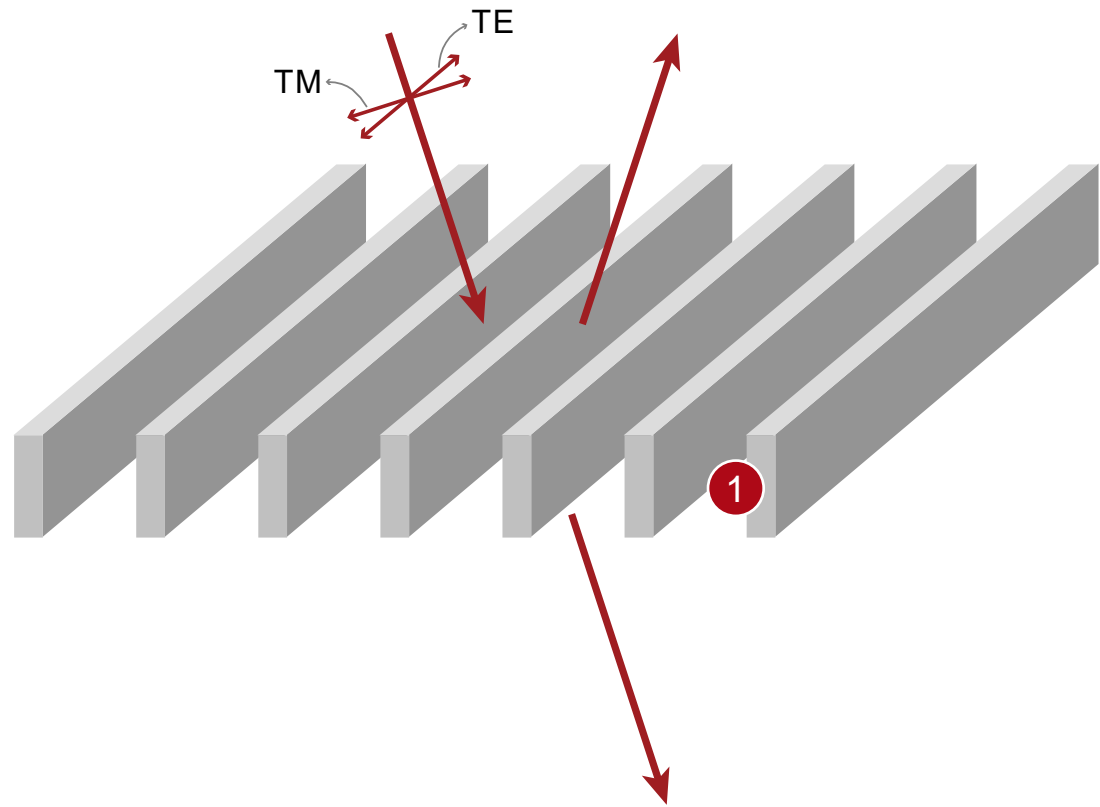
# Workflow in VirtualLab Fusion

- Construct grating structure
  - [Configuration of Grating Structures by Using Interfaces](#) [Use Case]
  - [Configuration of Grating Structures by Using Special Media](#) [Use Case]
- Analyze grating diffraction efficiency
  - [Grating Order Analyzer](#) [Use Case]
- Check influence from different parameters with Parameter Run
  - [Usage of the Parameter Run Document](#) [Use Case]
- Calculate field inside grating structure





# VirtualLab Fusion Technologies



# Document Information

title	Ultra-Sparse Dielectric Nano-Wire Grid Polarizers
document code	GRT.0006
version	2.0
edition	VirtualLab Fusion Advanced
software version	2020.1 (Build 1.202)
category	Application Use Case
further reading	<ul style="list-style-type: none"><li>- <a href="#">Grating order analyzer</a></li><li>- <a href="#">Rigorous Analysis and Design of Anti-Reflective Moth-Eye Structures</a></li><li>- <a href="#">Rigorous Analysis of Nanopillar Metasurface Building Block</a></li></ul>