# Analysis of Blazed Grating by Fourier Modal Method

Abstract
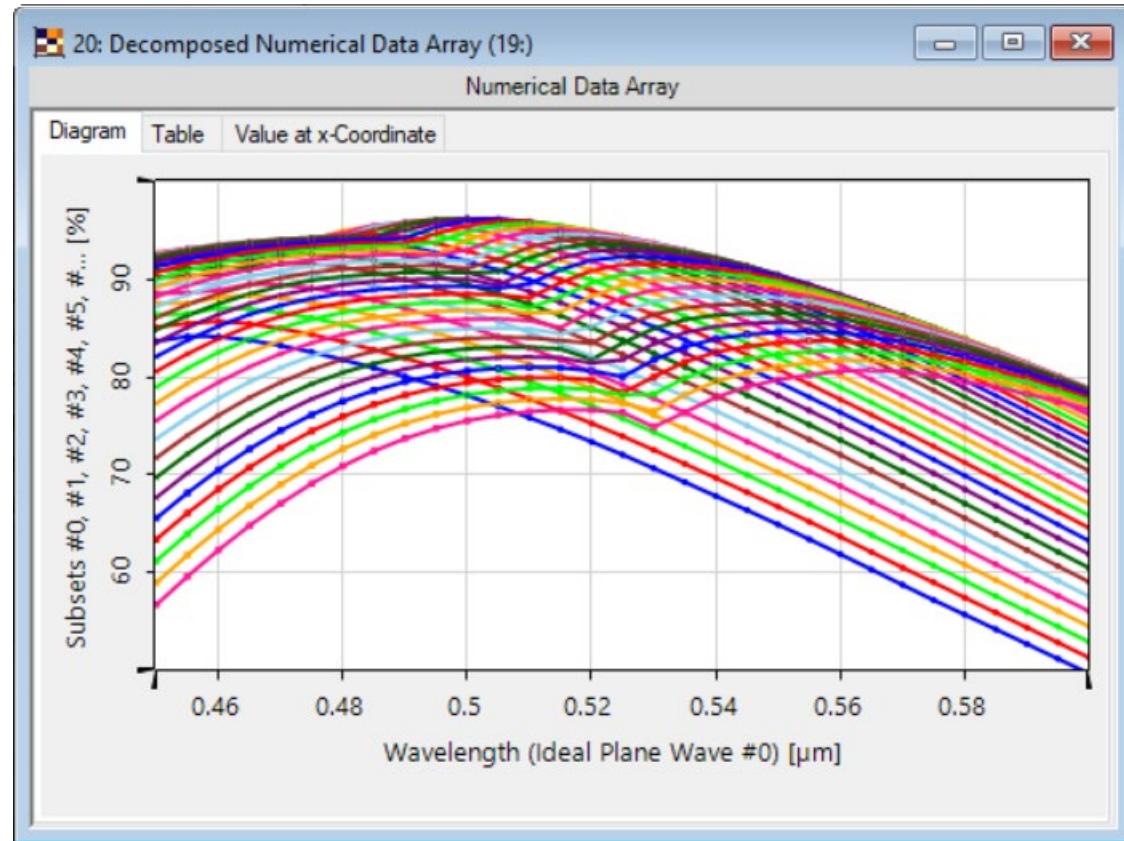
The Fourier modal method (FMM, also known as RCWA) can be used to analyze grating efficiencies rigorously. In VirtualLab Fusion you can setup your grating system, perform the rigorous analysis, and analyze the results in different format (e.g. grating order collection, single values, …). In combination with the Parameter Run you can scan over given parameter space to investigate the performance of the specified structure for different configurations.

Modeling Task

input plane wave
- incident angle (θ) 30-50°
- wavelength 450-600 nm
- linear polarization along x axis

sawtooth grating

depth 1.5 µm

period 600 nm

2nd order

1st order

0th order
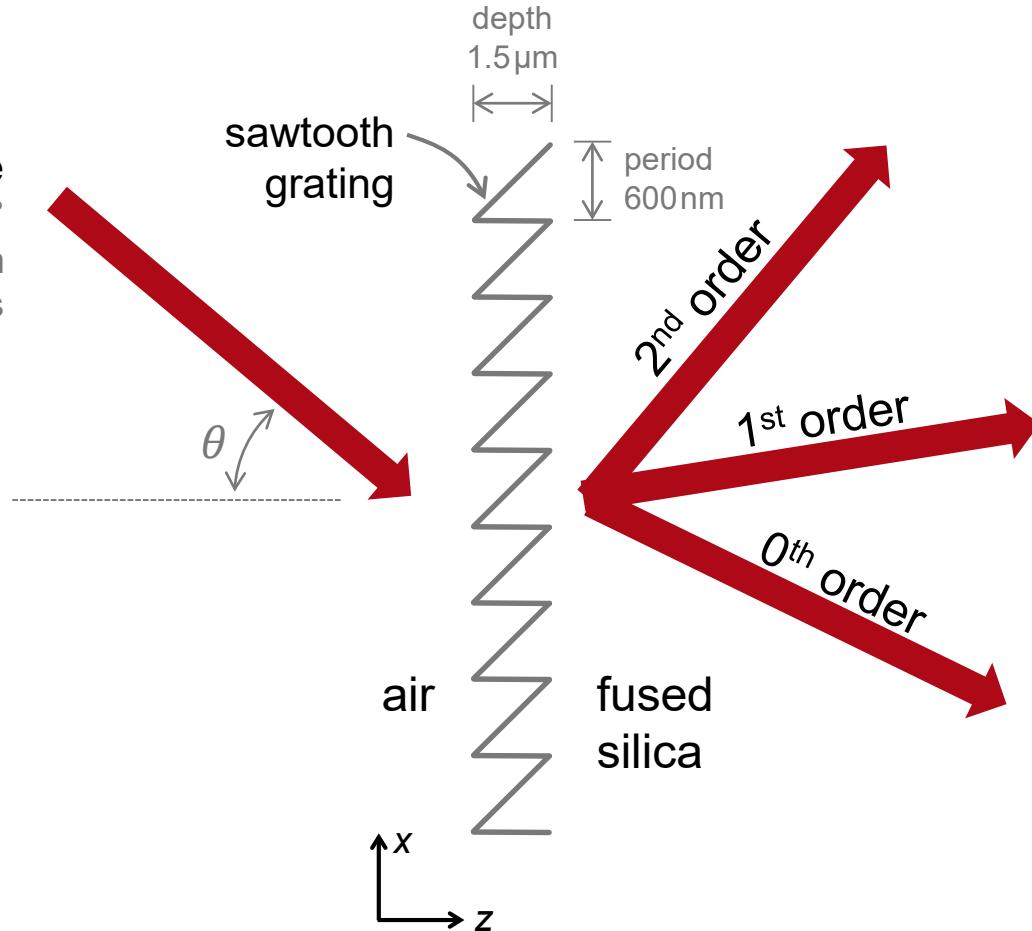
How to evaluate the efficiency of a specific diffraction order?

air

fused silica

θ

x

z

Results from Single FMM Simulation
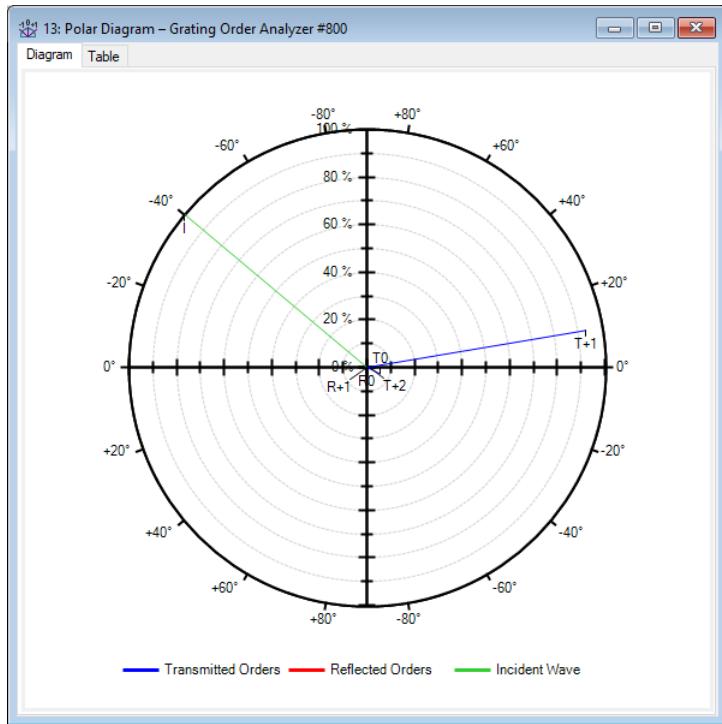
polar diagram
used for projected visualization of grating efficiencies for transmission and reflection

order collection
display of efficiency or other quantity with respect to e.g. diffraction order, angle, etc.

result table (transmission)

|	angle	efficiency
0th order	-26.107°	6.1579%
1st order	9.6014°	93.266%
2nd order	50.682°	0.57293%
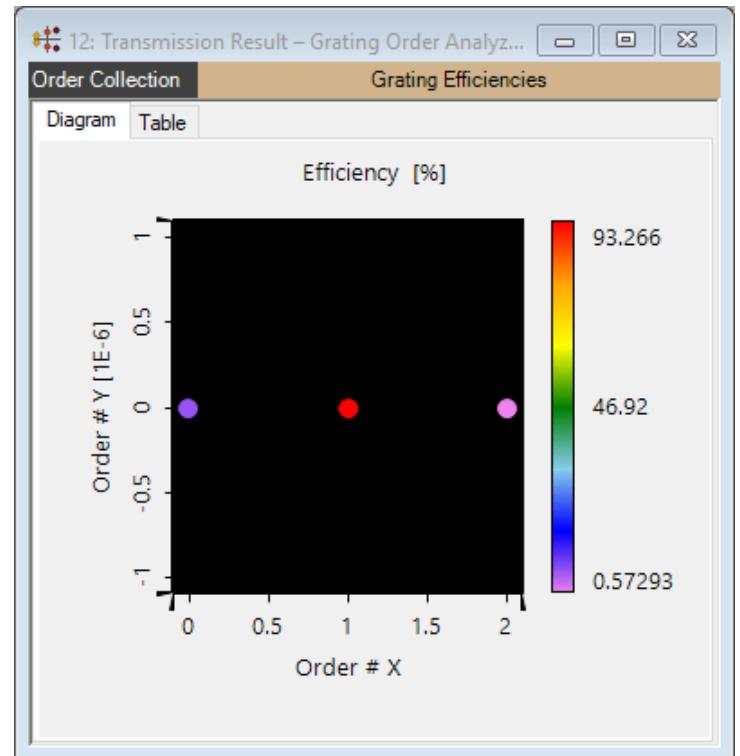
Parameter Scanning (1D)
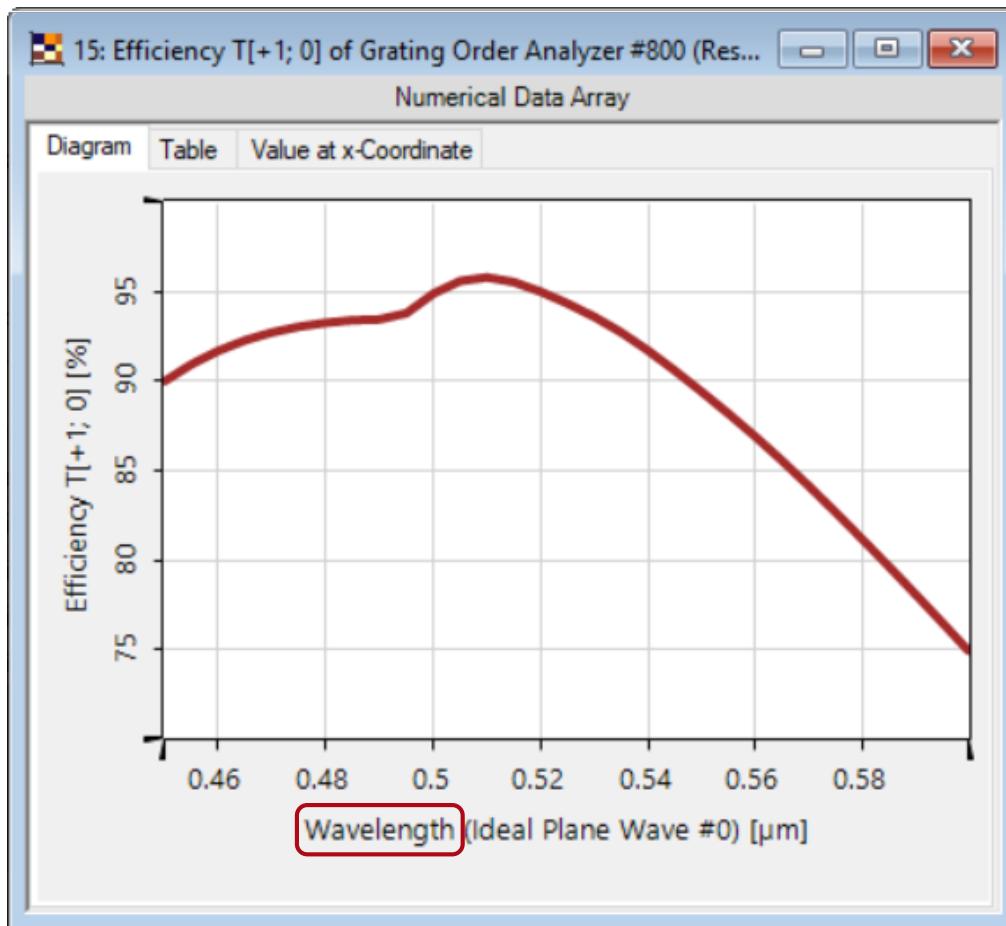
parameter variation (@ θ = 40°)
- wavelength from 450 nm to 600 nm
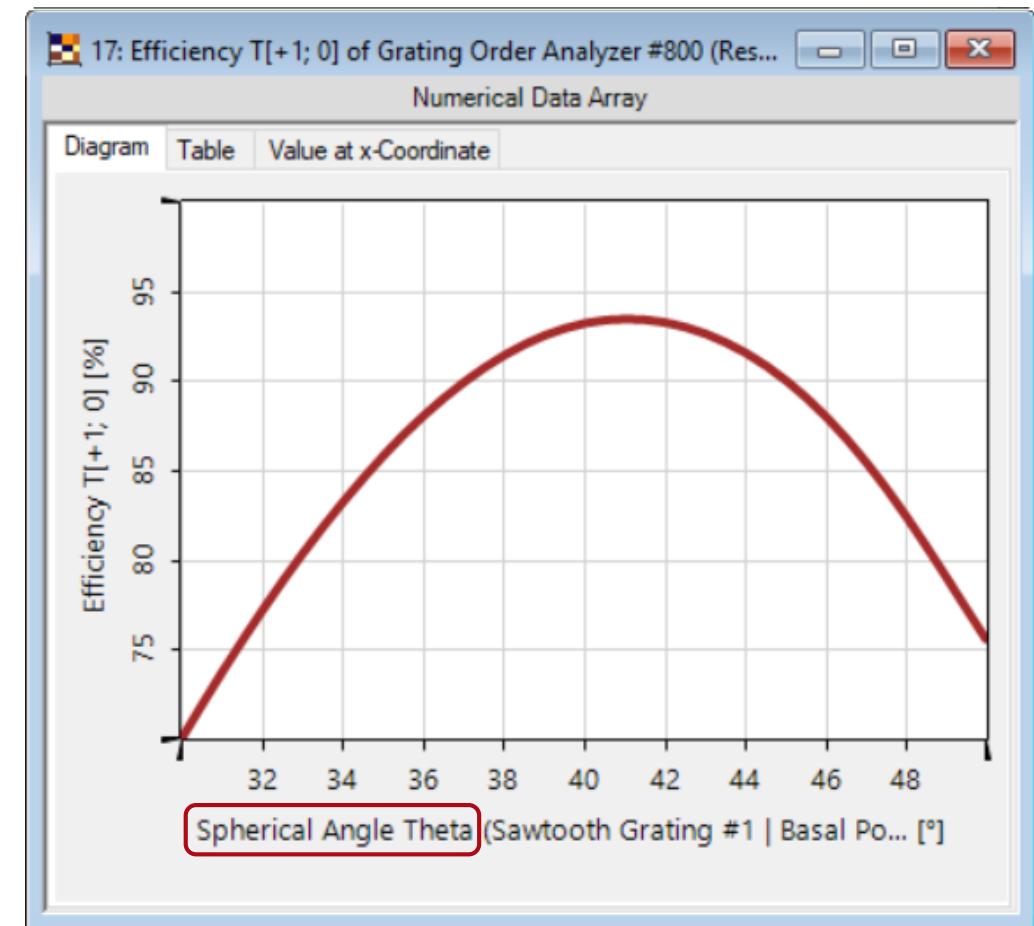
parameter variation (@ λ = 532 nm)
- incidence angle theta from 30° to 50°

Parameter Scanning (2D)
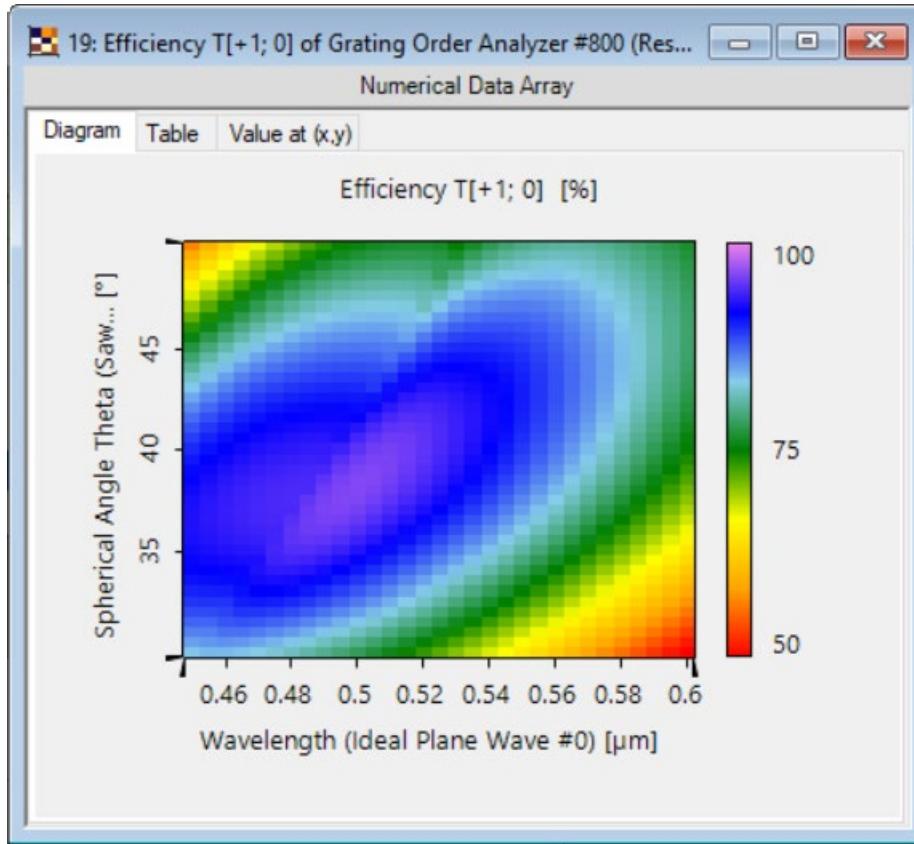
parameter variation

- wavelength from 450 nm to 600 nm
- incidence angle theta from 30° to 50°

VirtualLab allows to plot the efficiencies also as 1D multigraphs. Each curve is associated with one incident angle.
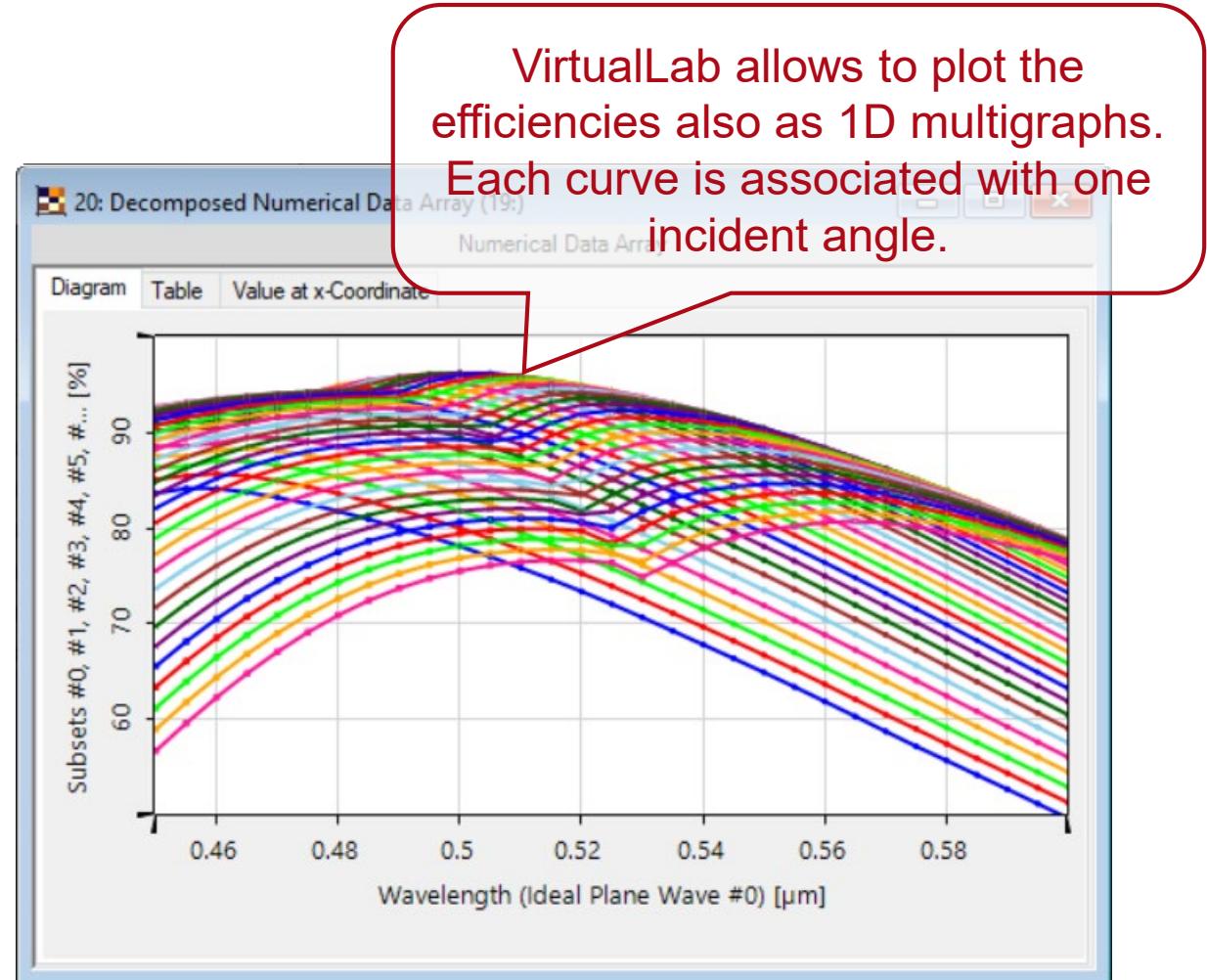
Document Information

title	Analysis of Blazed Grating by Fourier Modal Method
document code	GRT.0001
version	1.1
toolbox(es)	Grating Toolbox
VL version used for simulations	7.4.0.49
category	Feature Use Case
further reading	- Grating Order Analyzer - Optimization of Lightguide Coupling Grating for Single Incidence Direction