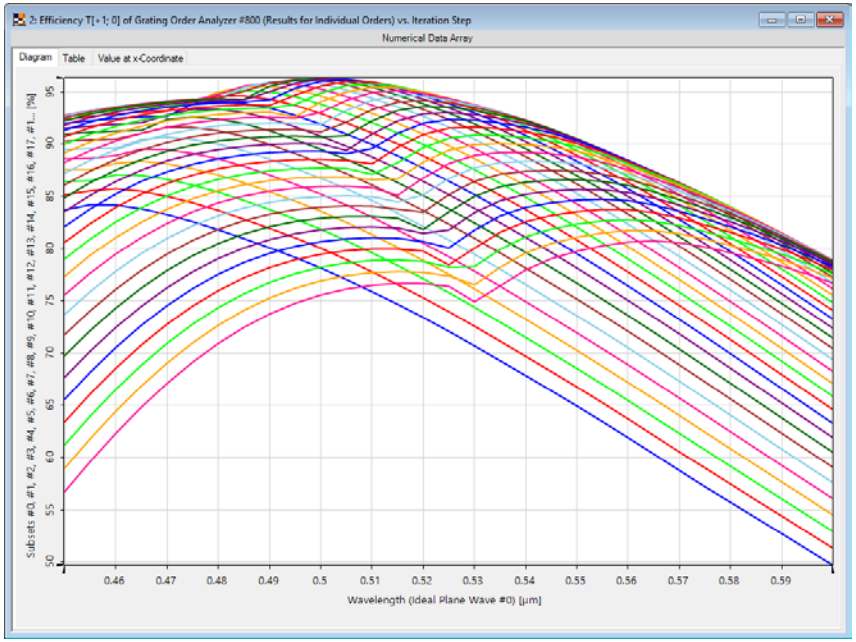
Analysis of Blazed Grating by Fourier Modal Method

Abstract

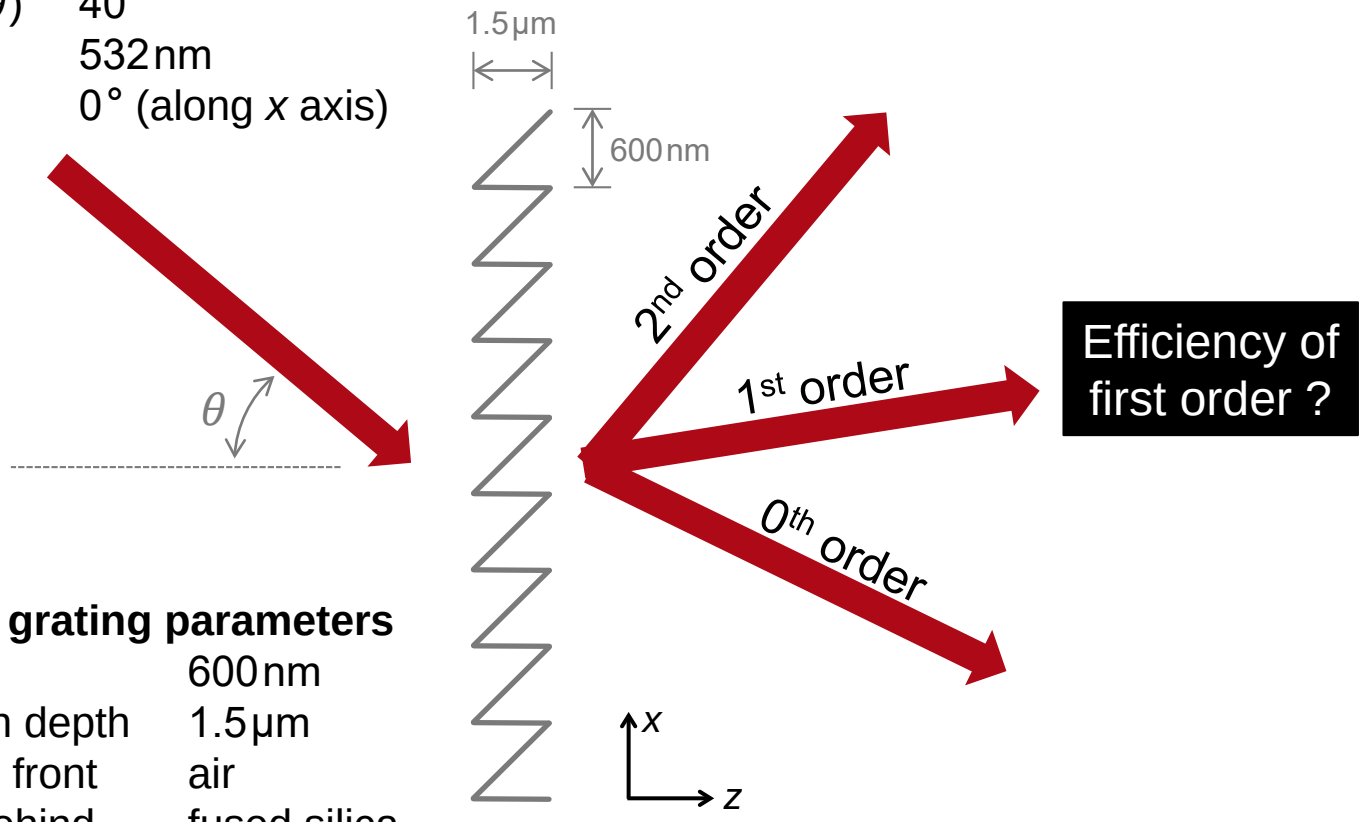


The Fourier modal method (FMM) can be used to analyze grating efficiencies rigorously. In VirtualLab you can setup your grating system, perform the rigorous analysis, and present the results in different format (e.g. grating order collection, single values, …). In combination with the parameter run you can also scan a given parameter space to investigate the performance of the specified structure for different configurations. For the evaluation of the results of the parameter run, several evaluation tools are available to give you the best insight in your optical setup.

Modeling Task

Incident plane wave

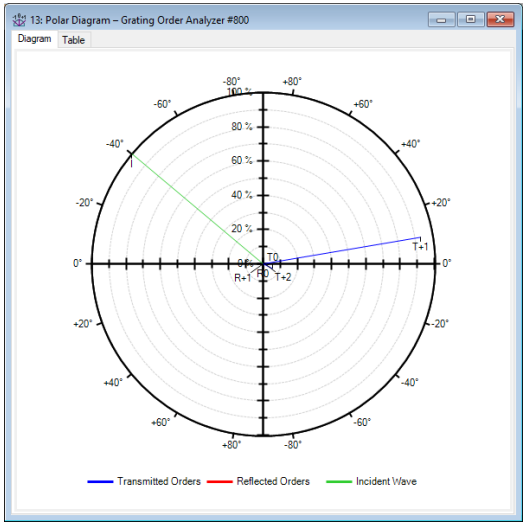
incident angle (θ)	40°
wavelength (λ)	532 nm
polarization	0° (along *x* axis)



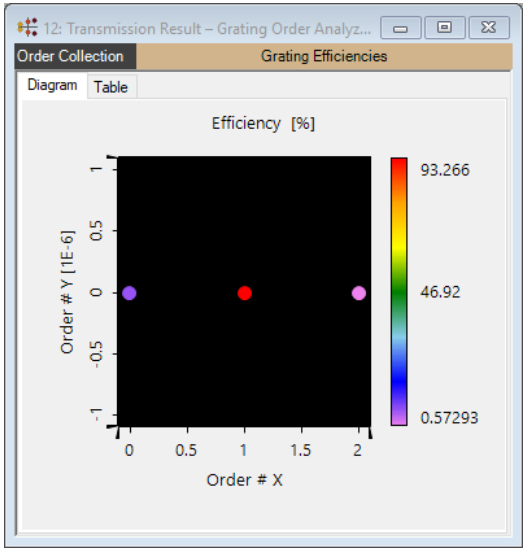
Sawtooth grating parameters

period	600 nm
modulation depth	1.5 µm
material in front	air
material behind	fused silica

Results



Polar diagram
used for projected visualization of grating efficiencies for transmission and reflection

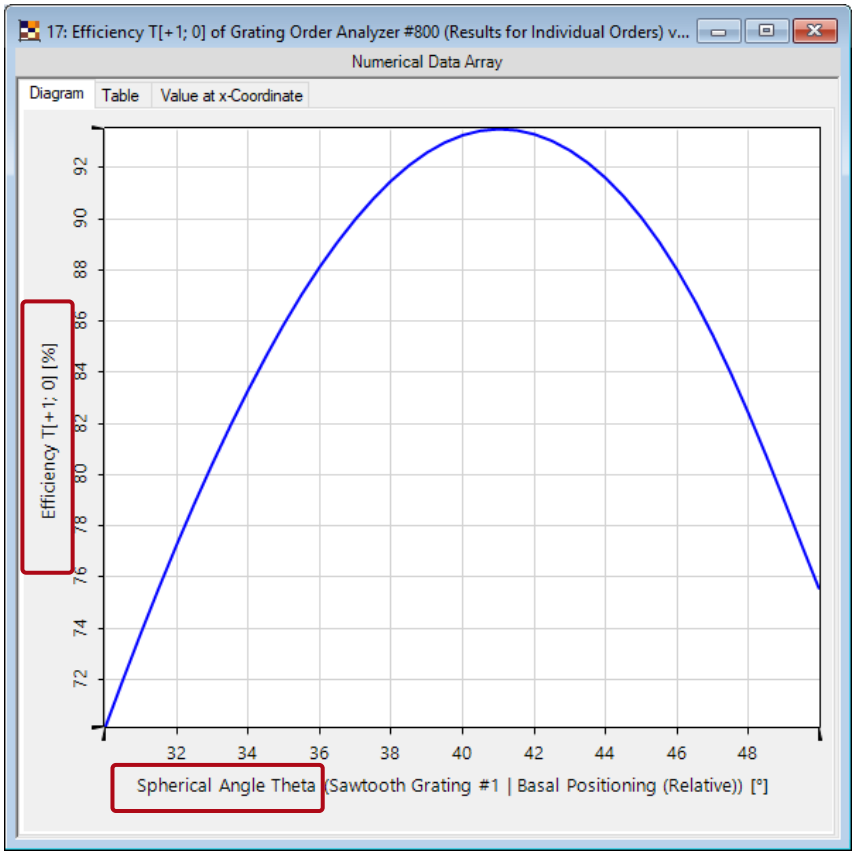


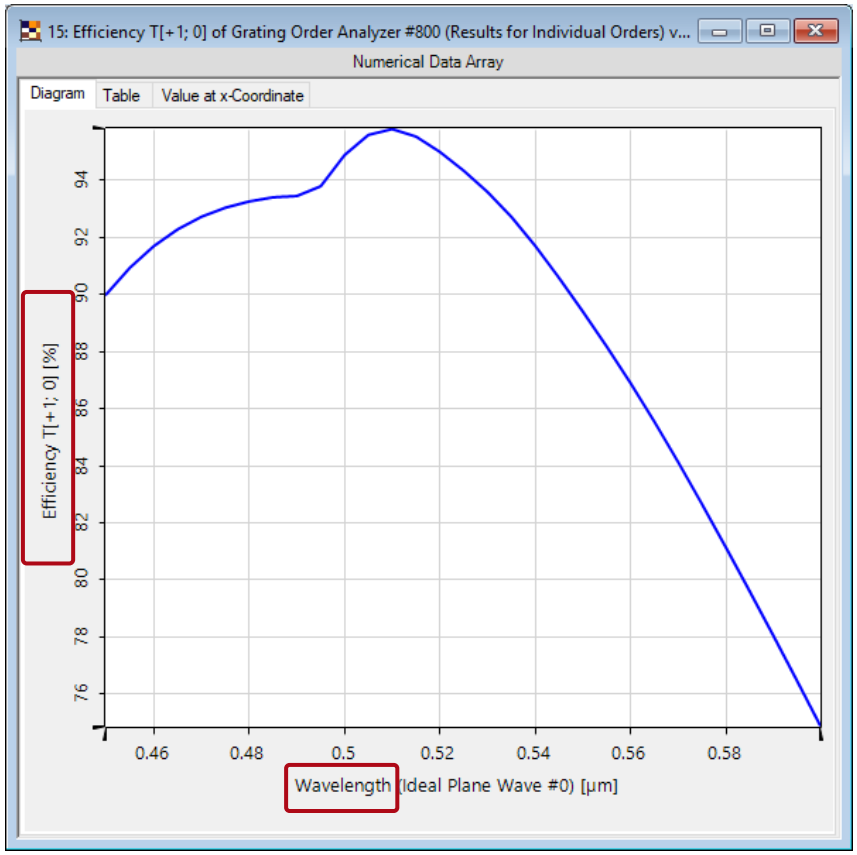
Order collection
display of efficiency or other quantity with respect to e.g. diffraction order, angle, etc.

Results in transmission:

	Angle	Efficiency
0^{th} order	-26.107°	6.1579%
1^{st} order	9.6014°	93.266%
2^{nd} order	50.682°	0.57293%

Results





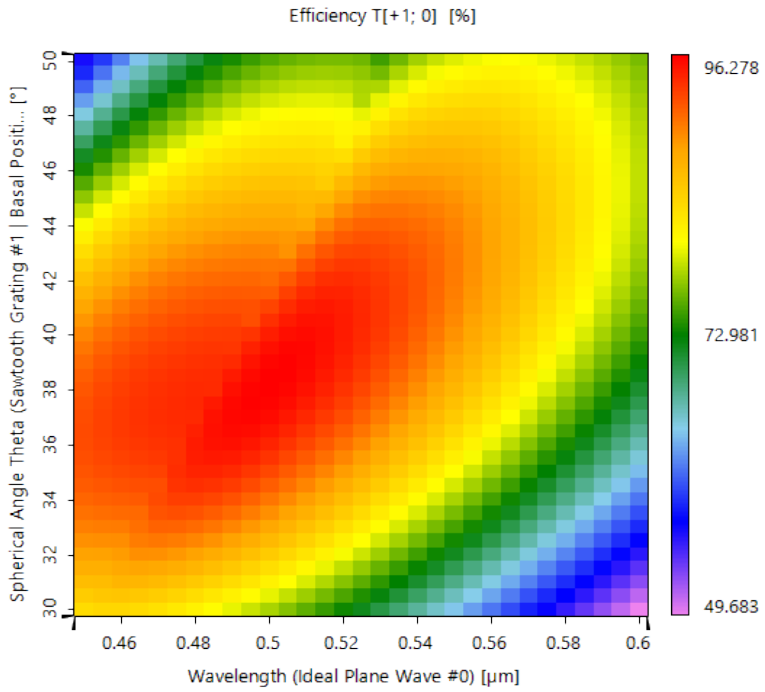
Parameter variation (fixed $\lambda = 532\,\text{nm}$)

theta 30° - 50°

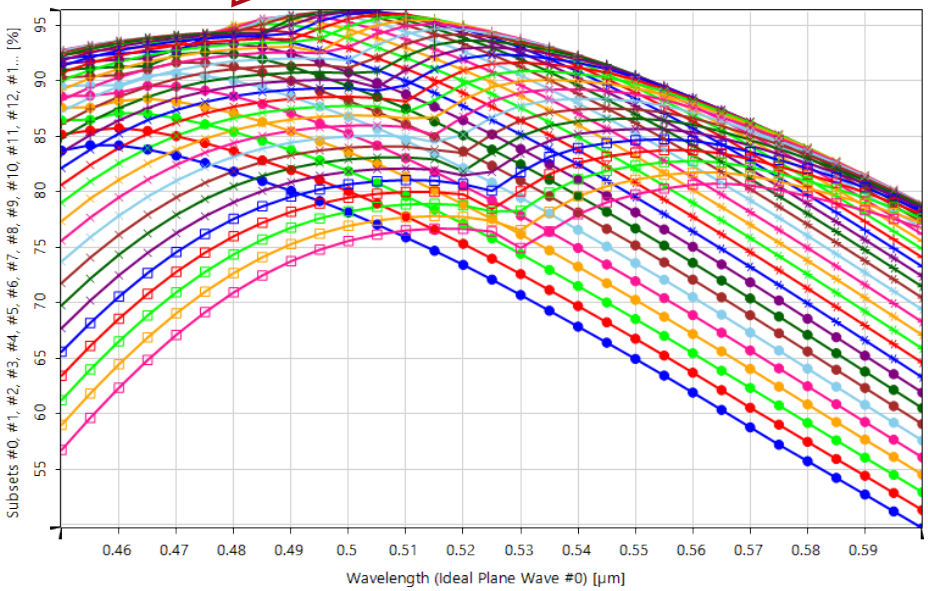
Parameter variation (fixed $\theta = 40°$)

wavelength 450 nm - 600 nm

Results



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



Parameter Variation

theta	30° - 50°
wavelength	450nm - 600nm

Document Information

title	Analysis of Blazed Grating by Fourier Modal Method
version	1.0
VL version used for simulations	7.0.3.4
category	Technology Use Case