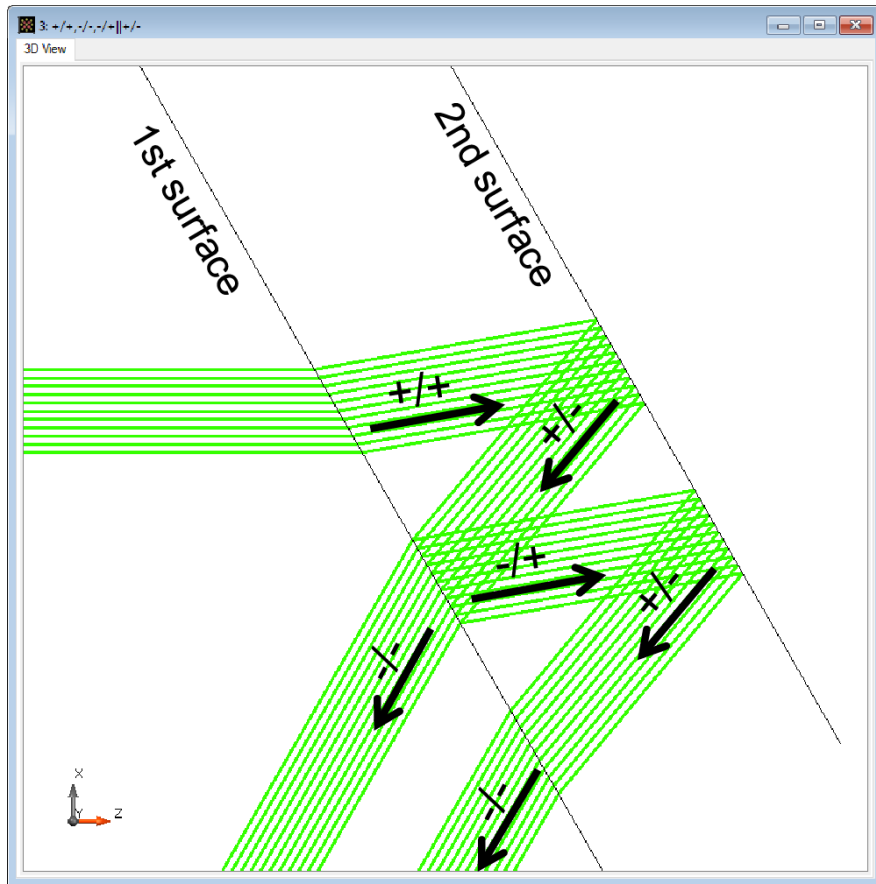


Channel Configuration for Surfaces and Grating Regions

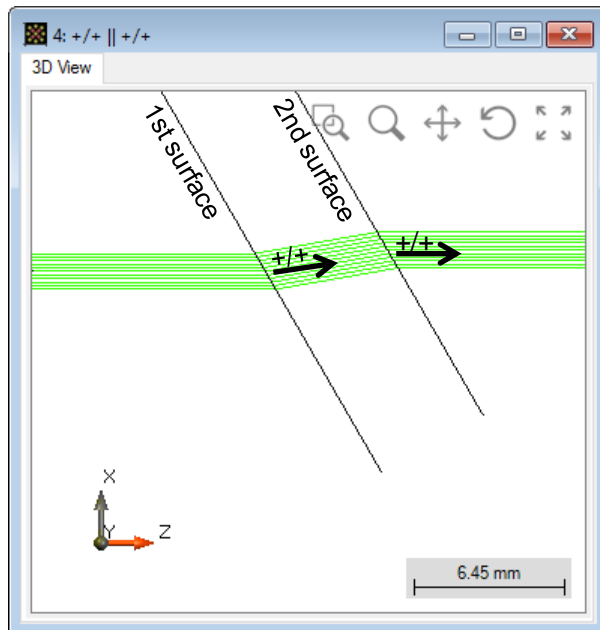
Abstract



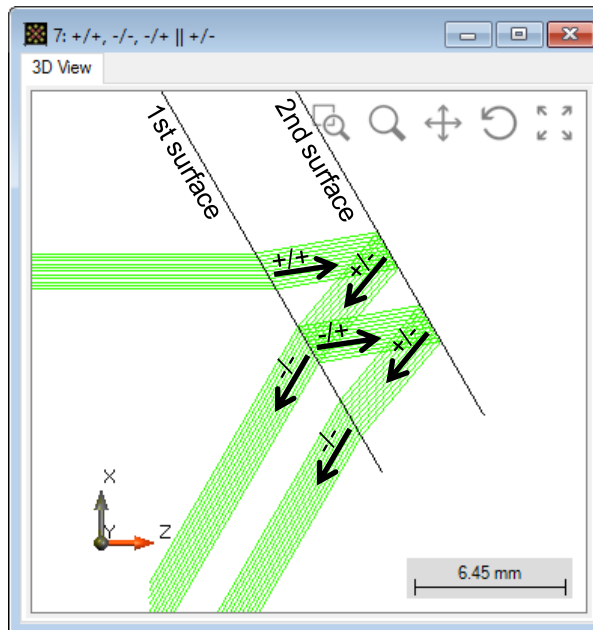
VirtualLab Fusion provides flexible configuration of the channels for surfaces and (grating) regions. By adjusting the channel configurations, one can realize desired modeling schemes easily. We demonstrate the configuration of channels by using an example of a light guide with two surfaces. With different settings, the resulting optical paths are shown. Additionally, we add grating regions on the light guide surfaces and demonstrate the configuration of regions, as well as the grating parameters of such regions.

Modeling Task

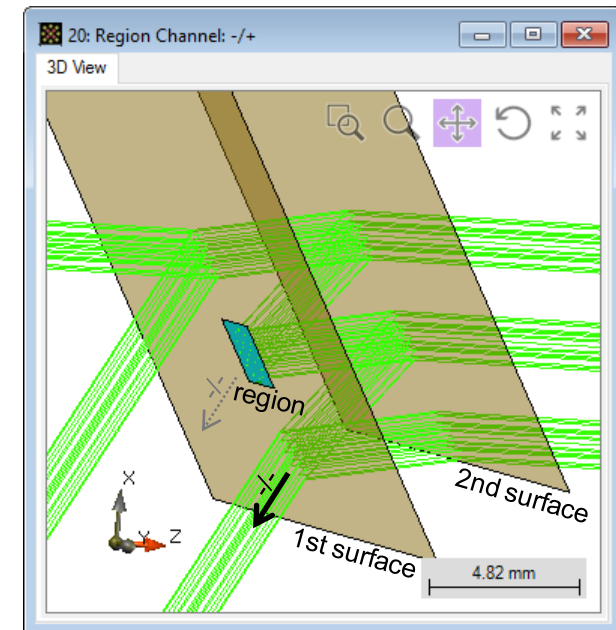
- how to adjust the channels on surfaces and possible grating regions, and how to control the modeling with these settings.



sequential channel setting for surfaces



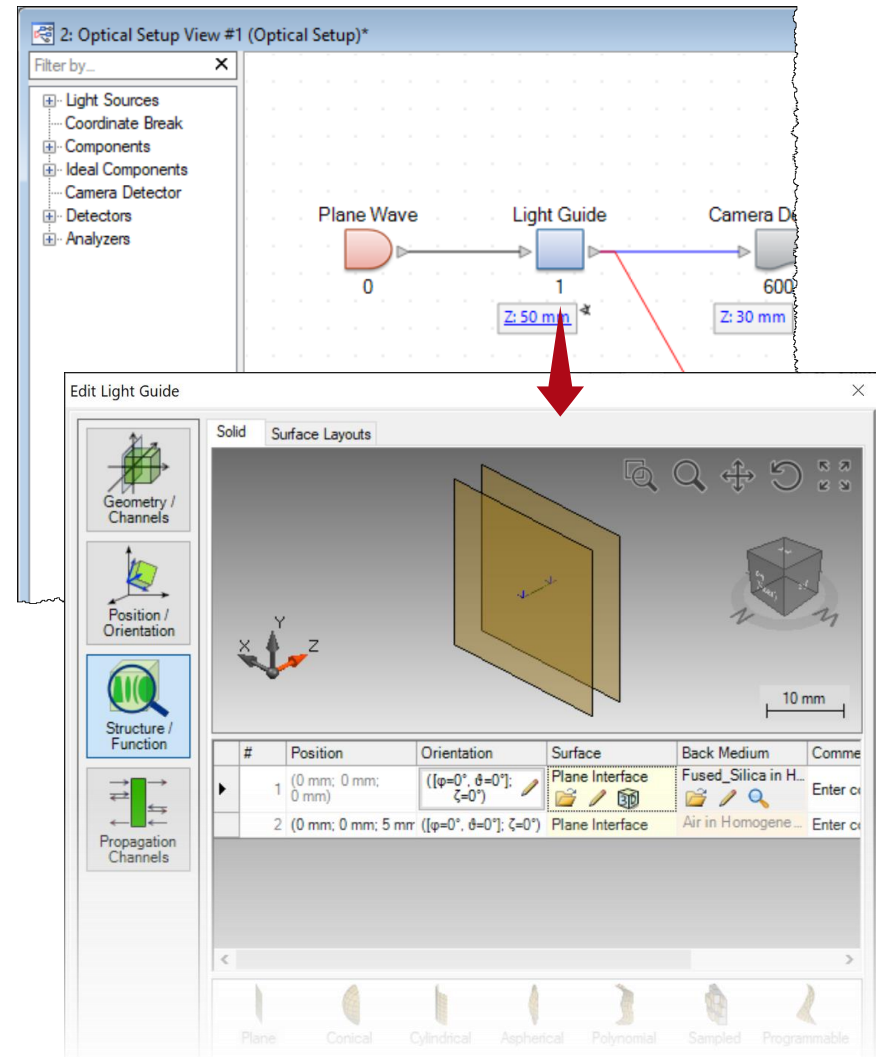
non-sequential channel setting for surfaces



additional channel control for region(s) on surface(s)

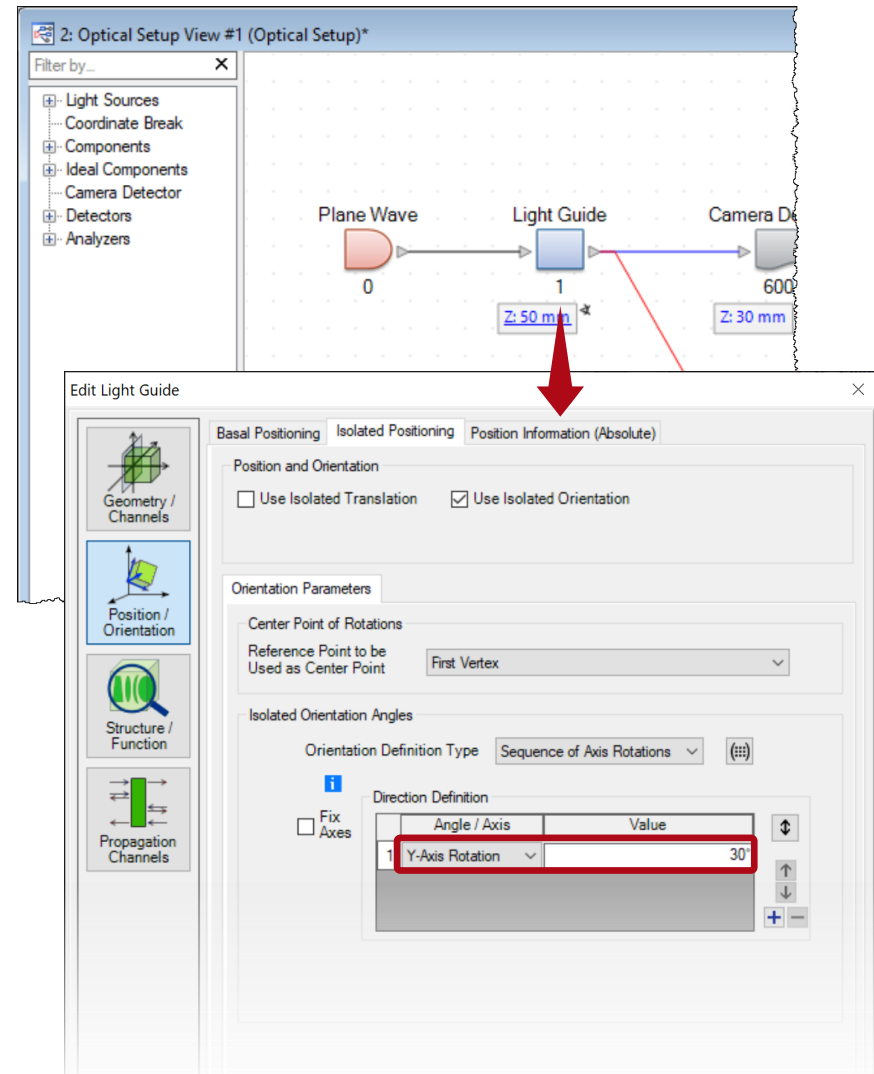
Surface Channels

- Initialization
 - Create a planar light guide made of fused silica, with a thickness of 5 mm, by using two plane surfaces.



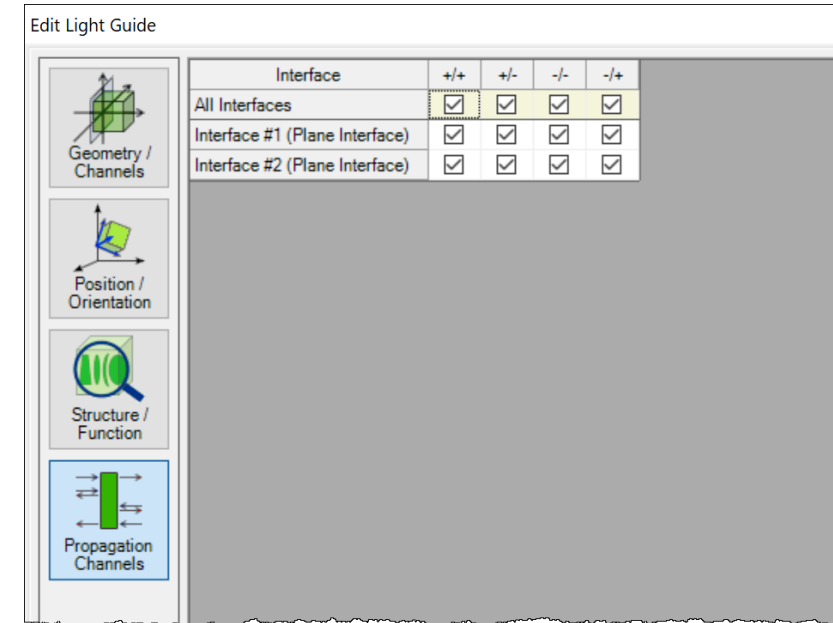
Surface Channels

- Initialization
 - Create a planar light guide made of fused silica, with a thickness of 5mm, by using two plane surfaces.
 - For better illustration, define an isolated Y-Axis Rotation of 30° for the waveguide.



Surface Channels

- Channel definition
 - There are four possible channels for each surface, at least one should be activated for the tracing.
 - Channels can be defined for each surface individually.
 - Different settings on channels leads to different modeling schemes.

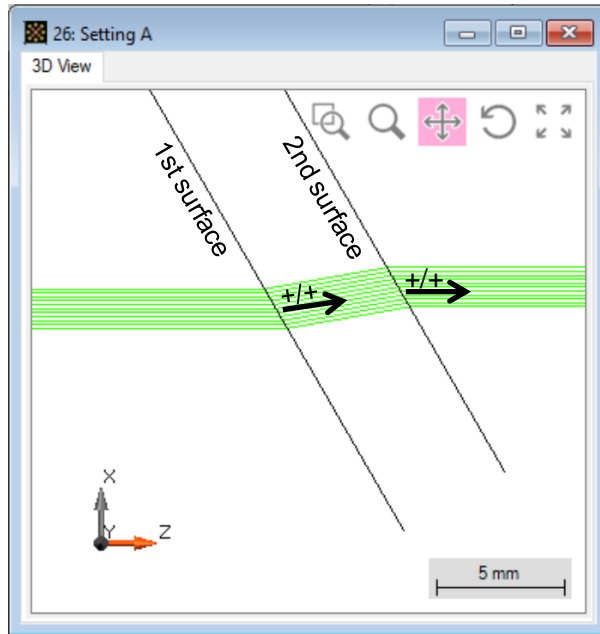


Channel Description

+/+	transmission (forward)
+/-	reflection (forward)
-/+	reflection (backward)
-/-	transmission (backward)

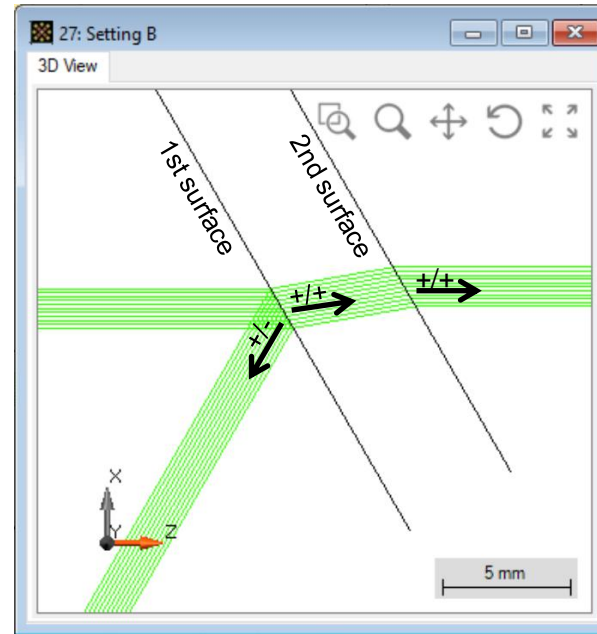
Surface Channels

Setting A



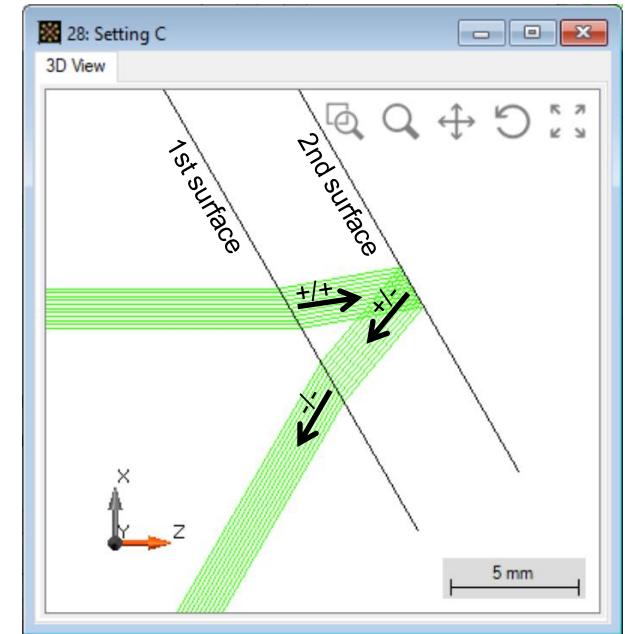
Surface	+/+	+/-	-/-	-/+
1st	×			
2nd	×			

Setting B



Surface	+/+	+/-	-/-	-/+
1st	×	×		
2nd	×			

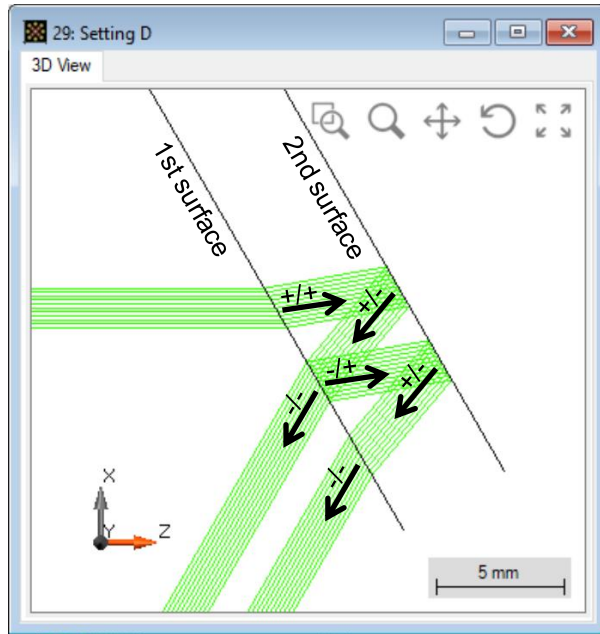
Setting C



Surface	+/+	+/-	-/-	-/+
1st	×		×	
2nd		×		

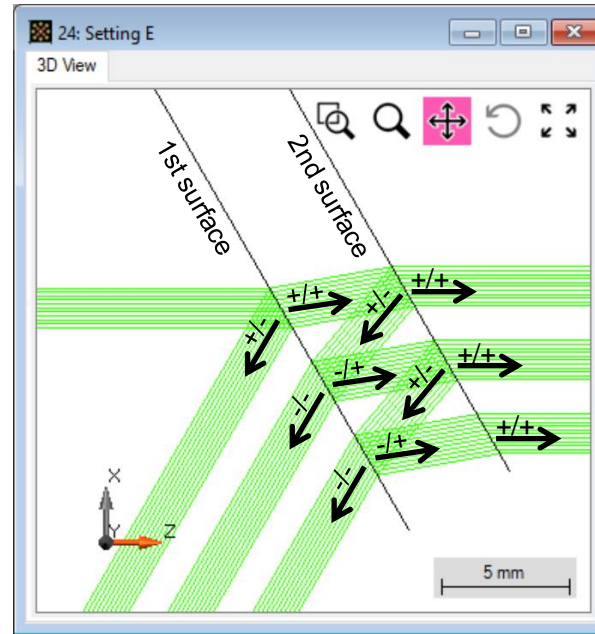
Surface Channels

Setting D



Surface	+/+	+/-	-/-	-/+
1st	×		×	×
2nd		×		

Setting E

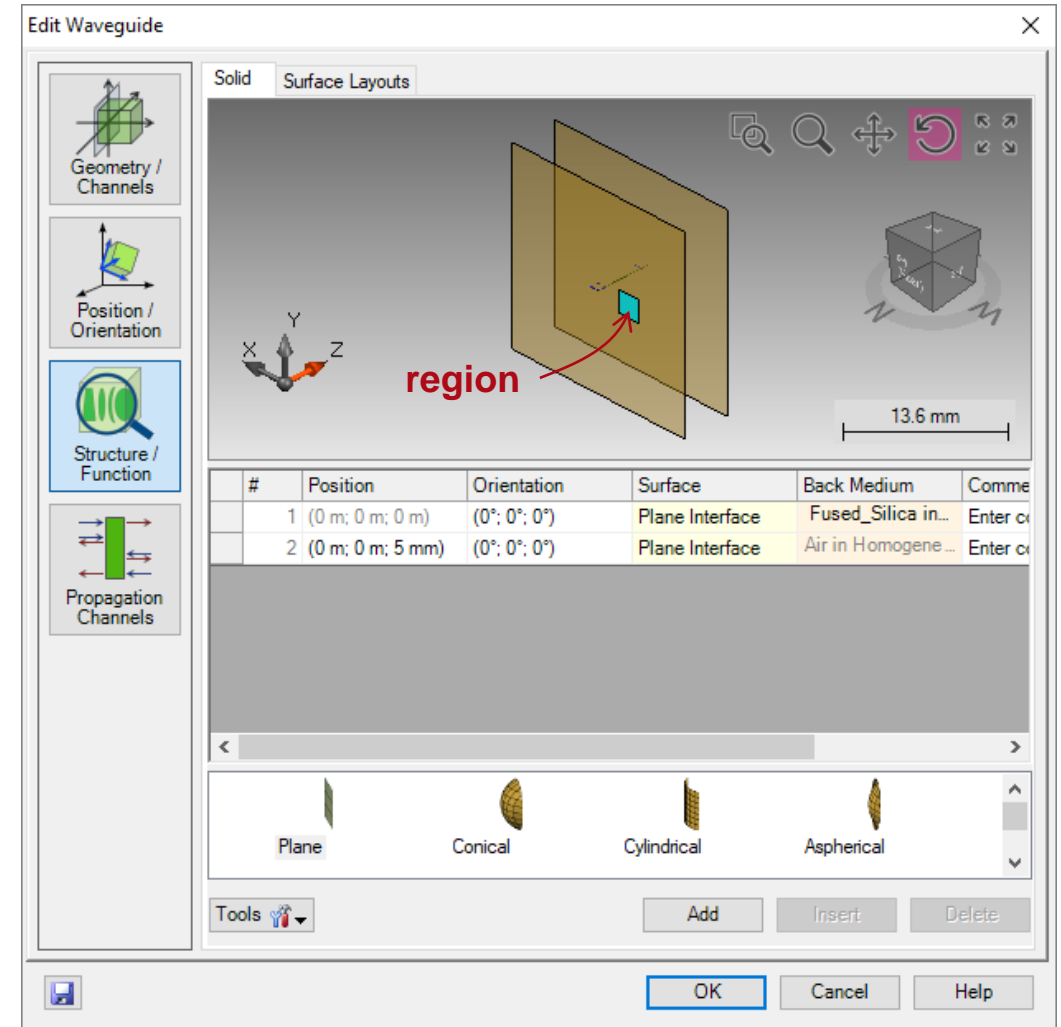


Surface	+/+	+/-	-/-	-/+
1st	×	×	×	×
2nd	×	×	×	×

Note: an activated channel does not necessarily lead to corresponding light path(s). E.g., the -/- and -/+ channel of 2nd interface do not influence the tracing, because there is no backward incidence.

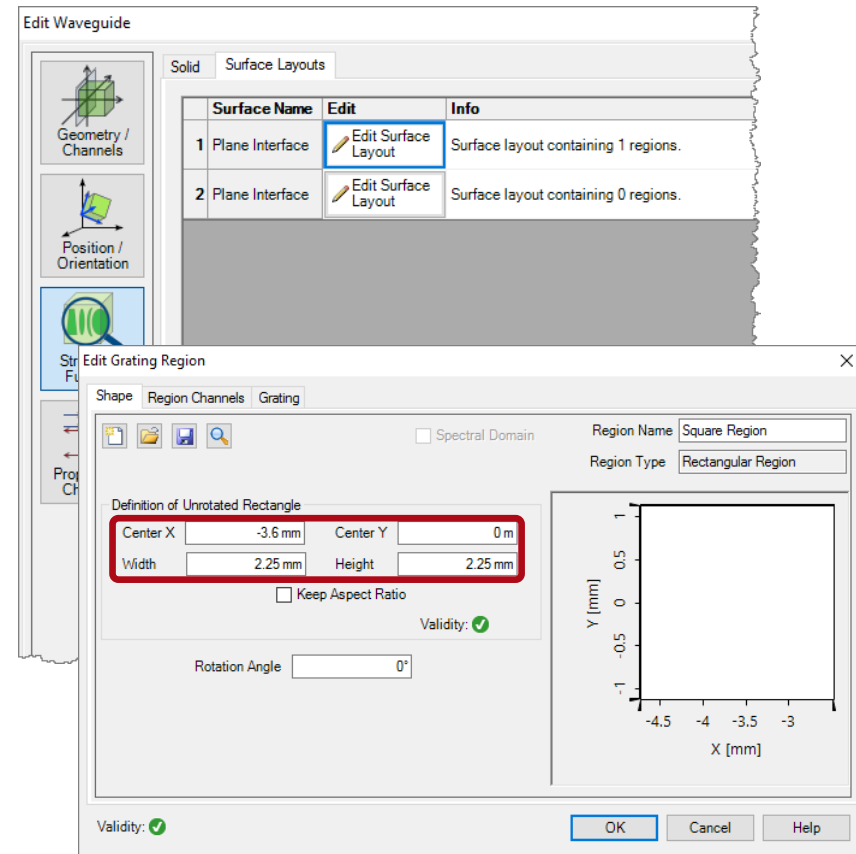
Region Channels

- Region(s) on surface
 - It is possible to define individual Regions on a surface and define their optical properties individually, including the channel settings.



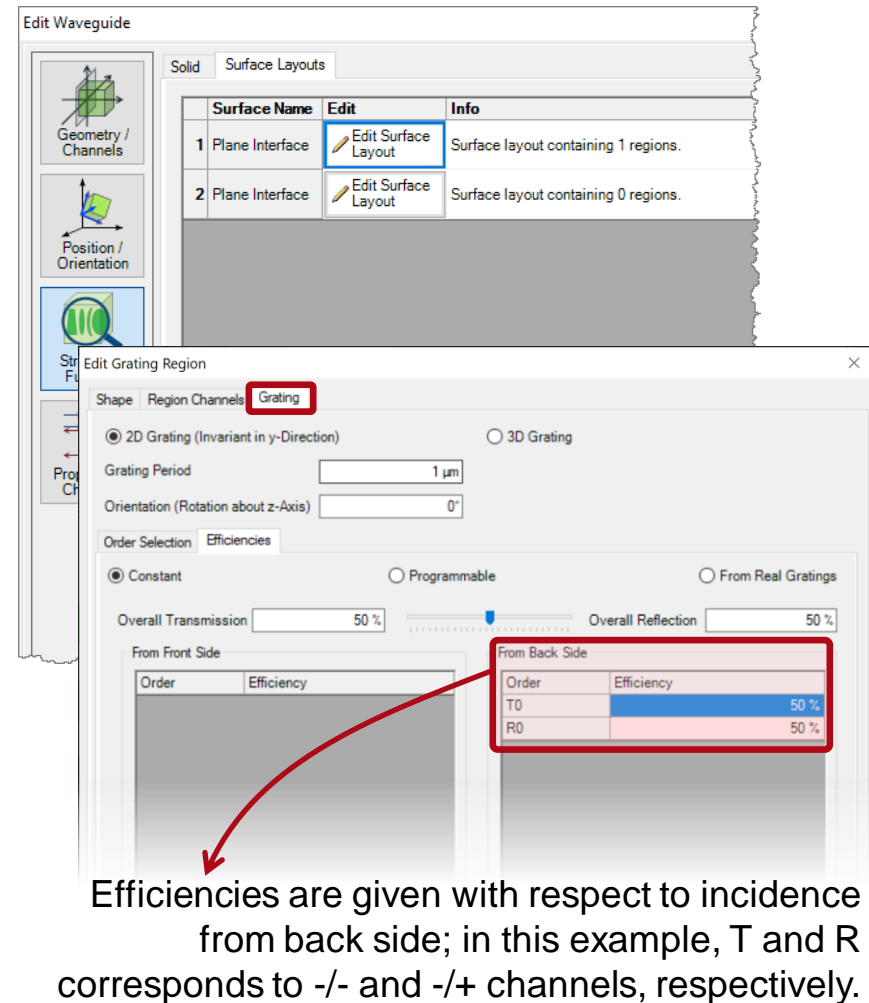
Region Channels

- Region definition
 - Create a rectangular region on 1st surface.
 - Set the region size as 2.25mm×2.25mm, and its center at -3.6mm along x-direction.



Region Channels

- Region definition
 - Create a rectangular region on 1st surface.
 - Set the region size as $2.25\text{mm} \times 2.25\text{mm}$, and its center at -3.6mm along x-direction.
 - Define this region as grating with single transmission order $T_0 = 50\%$, and single reflection order $R_0 = 50\%$, which makes a semi-reflective mirror.
 - Here we work with zeroth diffraction orders only, which is identical to the usually transmission or reflection due to refraction.



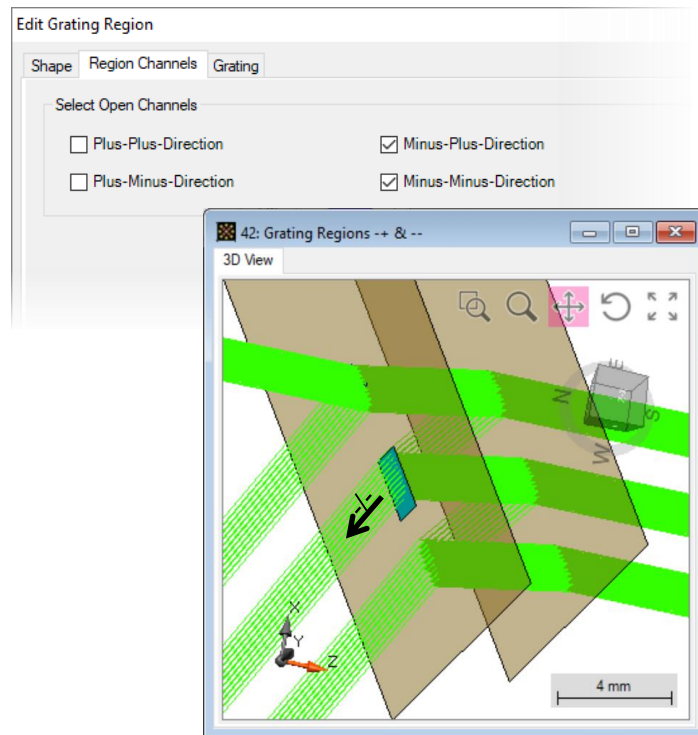
The screenshot shows the 'Edit Waveguide' interface with the 'Edit Grating Region' dialog box open. The 'Grating' tab is selected, and the 'Efficiencies' section is visible. The 'From Back Side' table shows the following data:

Order	Efficiency
T0	50 %
R0	50 %

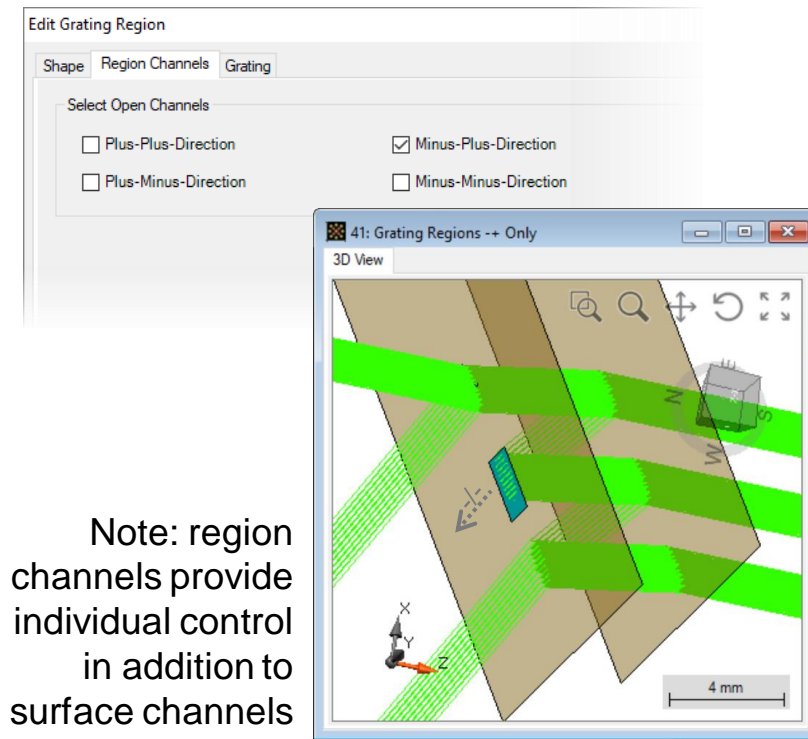
Efficiencies are given with respect to incidence from back side; in this example, T and R corresponds to -/- and -/+ channels, respectively.

Region Channels

- Region definition
 - Set up the channels for this region, following the same rule as for the surfaces.



region channels -/+ , -/- on

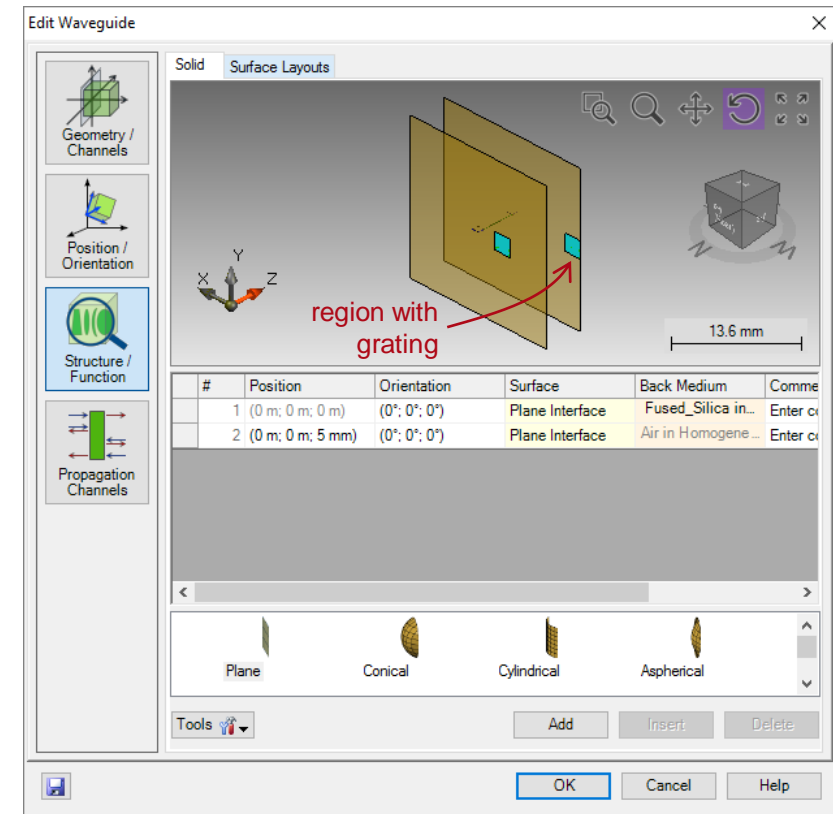


Note: region channels provide individual control in addition to surface channels

region channel -/+ on

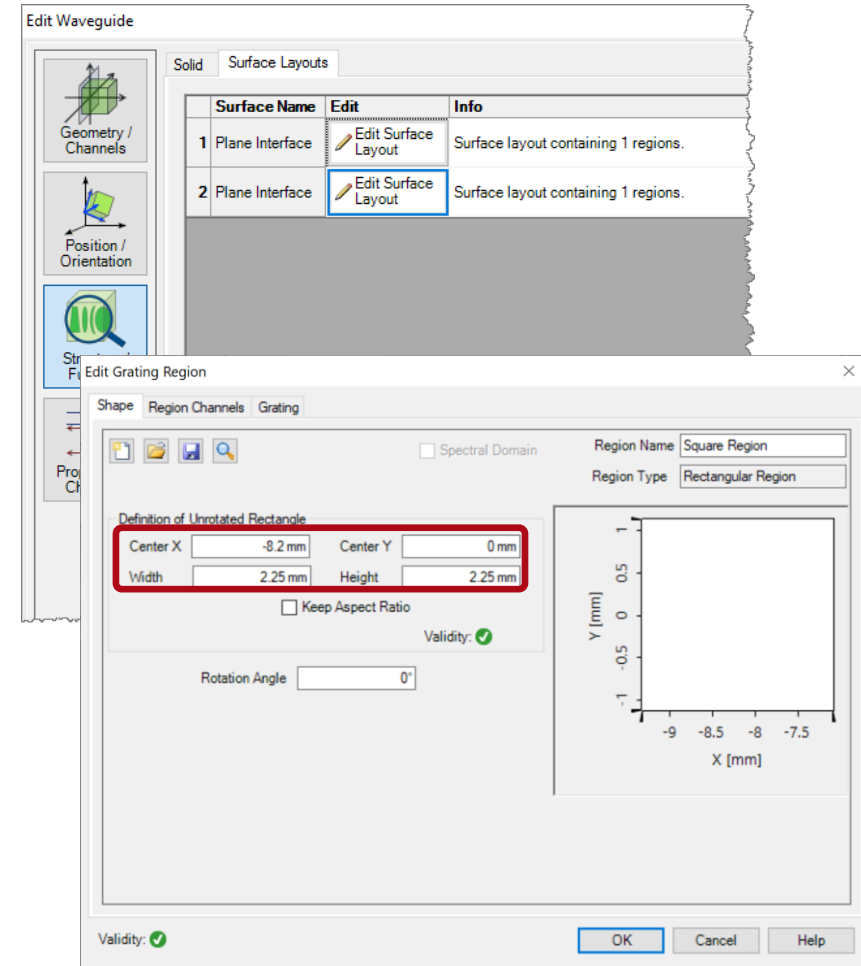
Region Channels with Grating

- Region definition
 - It is possible to define a diffractive grating on a given region.



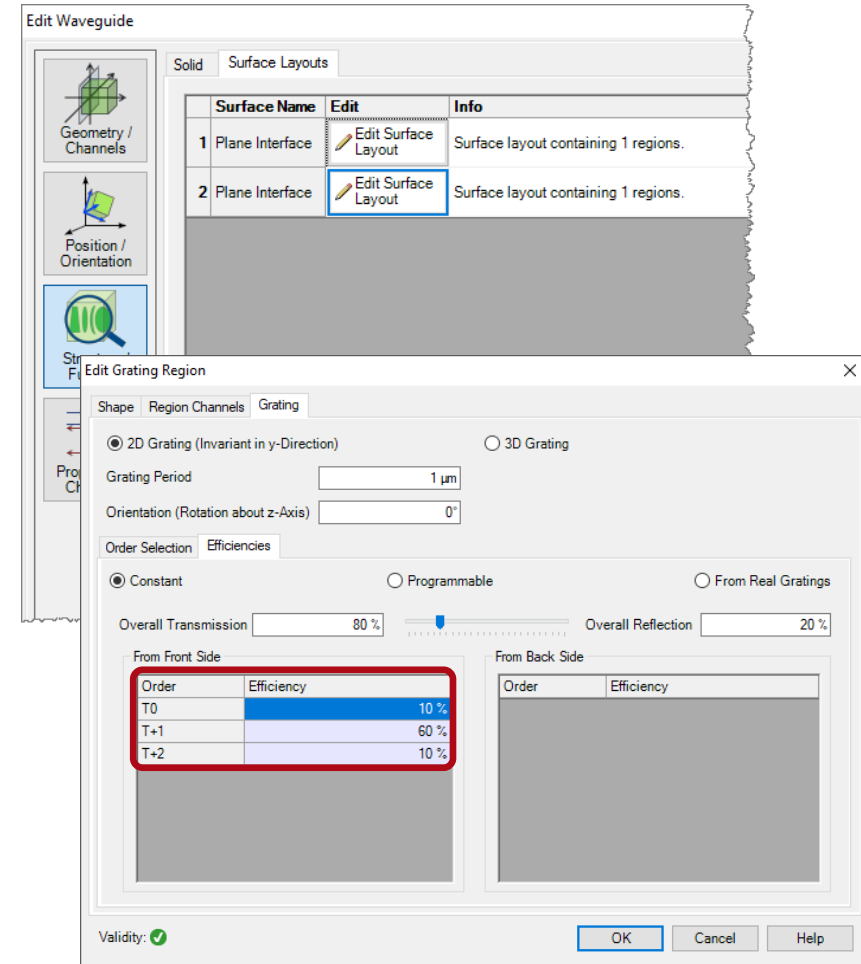
Region Channels with Grating

- Region definition
 - It is possible to define a diffractive grating on a given region.
 - We add a rectangular region (2.25 mm side length) on 2nd surface, centered at -8.2 mm along x-direction.



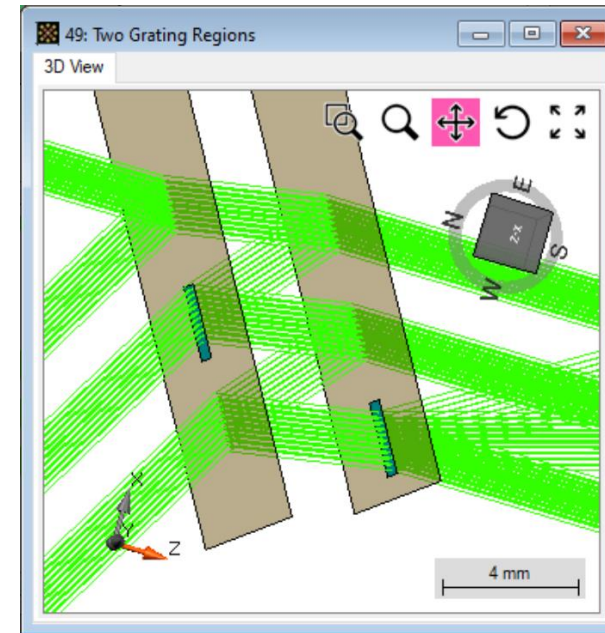
Region Channels with Grating

- Region definition
 - It is possible to define a diffractive grating on a given region.
 - We add a rectangular region (2.25mm side length) on 2nd surface, centered at -8.2mm along x-direction.
 - Define an ideal grating with 2 μ m period, and specified diffraction coefficients as
 - $T_0 = 10\%$
 - $T_{+1} = 60\%$
 - $T_{+2} = 10\%$.



Region Channels with Grating

- Region definition
 - It is possible to define a diffractive grating on a given region.
 - We add a rectangular region (2.25mm side length) on 2nd surface, centered at -8.2mm along x-direction.
 - Define an ideal grating with 2 μ m period, and specified diffraction coefficients as
 - $T_0 = 10\%$
 - $T_{+1} = 60\%$
 - $T_{+2} = 10\%$.



Region on surface 1: -/+ channel on
Region on surface 2: +/+ channel on
[with T_0 , T_{+1} , T_{+2} diffraction orders]

Document Information

title	Channel Setting for Non-Sequential Tracing
document code	MISC.0013
version	2.0
toolbox(es)	Starter Toolbox (Non-Sequential Extension)
VL version used for simulations	VirtualLab Fusion Summer Release 2019 (7.6.1.18)
category	Feature Use Case
further reading	<ul style="list-style-type: none">- <u>Non-Sequential Ray Tracing Analysis of Glass Plate</u>- <u>Modeling of Etalon with Planar or Curved Surfaces</u>- <u>Optimizing Waveguide Outcoupling Gratings for Uniform Multiple Channels</u>