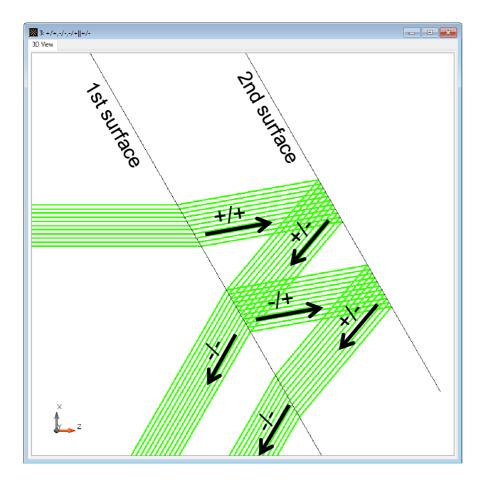


Channel Configuration for Surfaces and Grating Regions

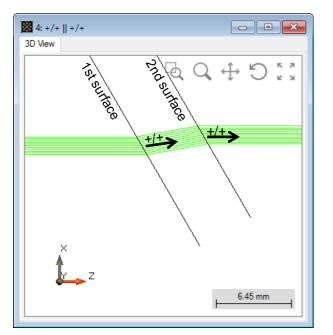
Abstract



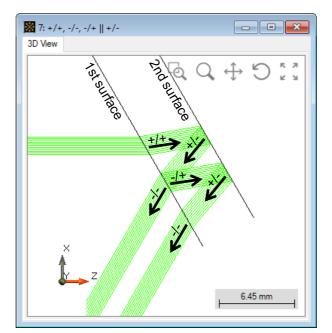
VirtualLab Fusion provides flexible configuration of the channels for surfaces and (grating) regions. By adjusting the channel configurations, one can realize desired modeling schemes easily. We demonstrate the configuration of channels by using an example of a light guide with two surfaces. With different 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

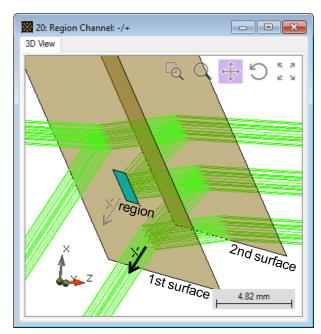
 how to adjust the channels on surfaces and possible grating regions, and how to control the modeling with these settings.



sequential channel setting for surfaces

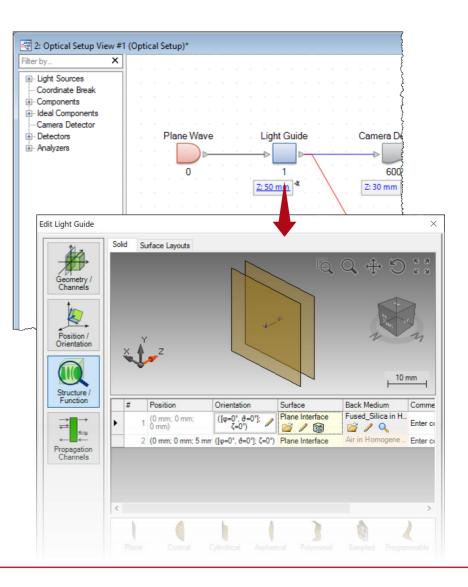


non-sequential channel setting for surfaces



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

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



- 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.

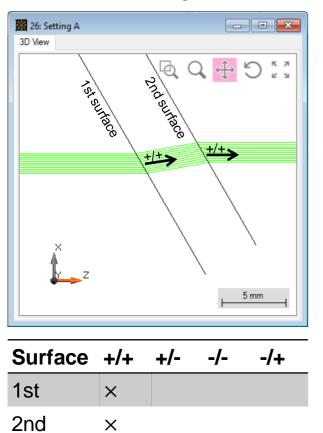
2: Optical Setup View #	1 (Optical Setup)*	
er by ×		
I- Light Sources Coordinate Break I- Components I- Ideal Components Camera Detector I- Detectors I- Analyzers	Plane Wave Light Guide Camera De	
Edit Light Guide		×
Geometry / Channels	sal Postioning Isolated Positioning Position Information (Absolute) Position and Orientation Use Isolated Translation Use Isolated Translation Orientation Parameters Center Point of Rotations Reference Point to be Used as Center Point Isolated Orientation Angles Orientation Definition Type Sequence of Axis Rotations Fix Direction Definition Fix Axis Value	

- 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.

1	Interface	+/+	+/-	-/-	-/+	
	All Interfaces					
	nterface #1 (Plane Interface)		\checkmark	\checkmark	\checkmark	
etry /	nterface #2 (Plane Interface)	\checkmark	\checkmark	\checkmark	\checkmark	
ion / lation						

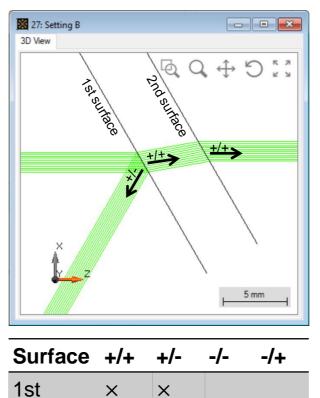
Channel	Description
+/+	transmission (forward)
+/-	reflection (forward)
-/+	reflection (backward)
-/-	transmission (backward)

Setting A



Х

Setting B



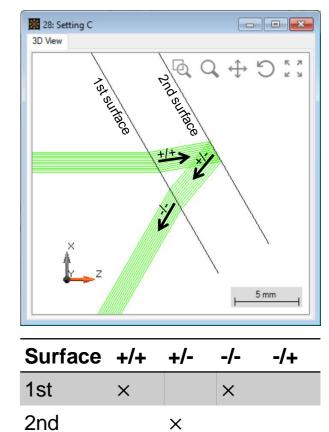
X

Х

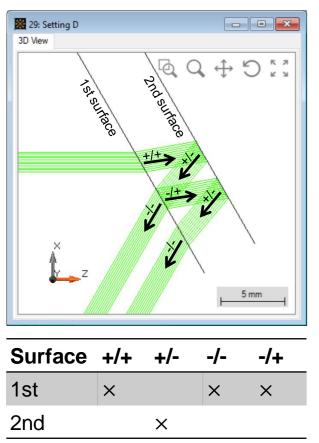
X

2nd

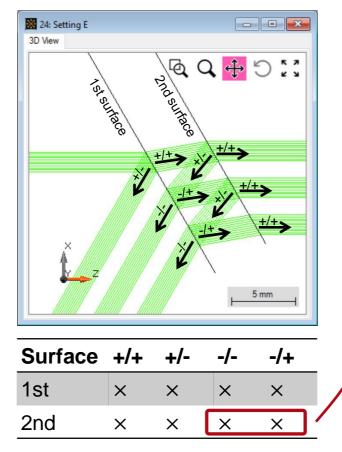
Setting C



Setting D

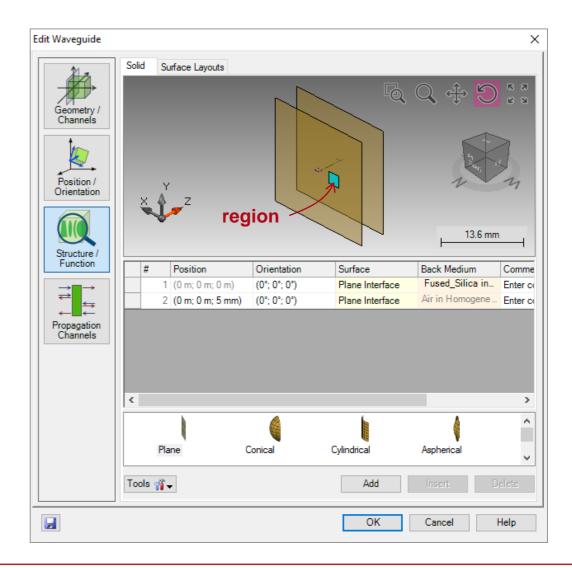


Setting E



 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.

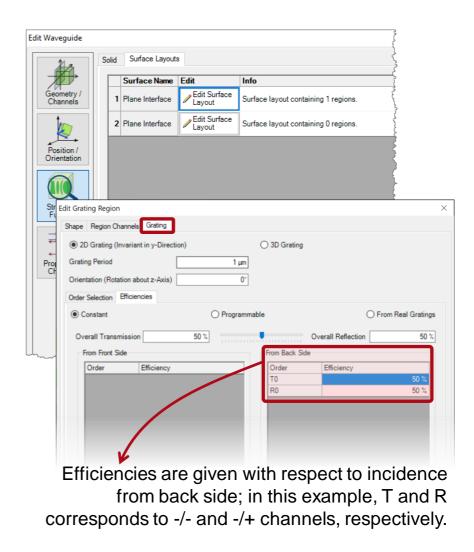
- Region(s) on surface
 - It is possible to define individual Regions on a surface and define their optical properties individually, including the channel settings.



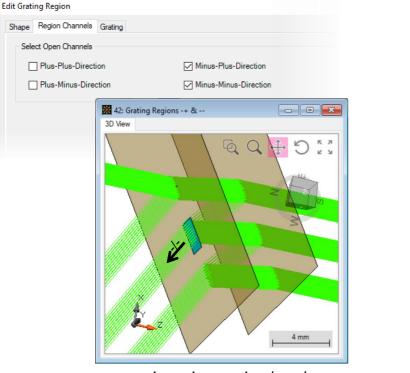
- Region definition
 - Create a rectangular region on 1st surface.
 - Set the region size as
 2.25mm×2.25mm, and its center at
 -3.6mm along x-direction.

Edit Wav	eguide				
	S	olid Surface Layouts	3		
		Surface Name	Edit	Info	
Geo Cha	metry / annels	1 Plane Interface	Edit Surface Layout	Surface layout (containing 1 regions.
1		2 Plane Interface	✓ Edit Surface Layout	Surface layout of	containing 0 regions.
	sition /		<u>r</u>		
Str	Edit Grating Re	gion			×
Fu	Shape Regio	on Channels Grating			
	P 😂 🛛		S	pectral Domain	Region Name Square Region
← Pro					Region Type Rectangular Region
Proj Cł	Definition of	Unrotated Rectangle			
	Center X	-3.6 mm	Center Y	0 m	
	Width	2.25 mm	Height	2.25 mm	- 05
		🗌 Кеер	p Aspect Ratio		[mm] ~ -
		Rotation Angle	Vali 0°	dity: 🕑	-0.5 -
		Notation Angle	0		÷
					-4.5 -4 -3.5 -3
					X [mm]
	Validity: 🕑				OK Cancel Help

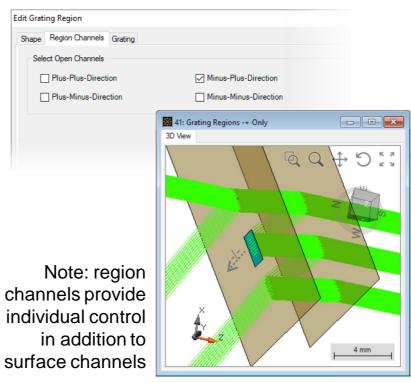
- Region definition
 - Create a rectangular region on 1st surface.
 - Set the region size as
 2.25mm×2.25mm, and its center at
 -3.6mm along x-direction.
 - Define this region as grating with single transmission order T0 = 50%, and single reflection order R0 = 50%, which makes a semi-reflective mirror.
 - Here we work with zeroth diffraction orders only, which is identical to the usually transmission or reflection due to refraction.



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

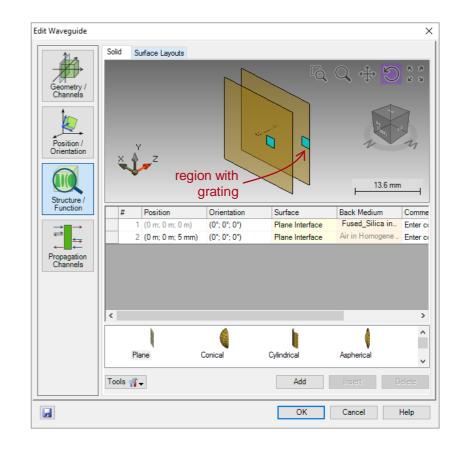


region channels -/+, -/- on



region channel -/+ on

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



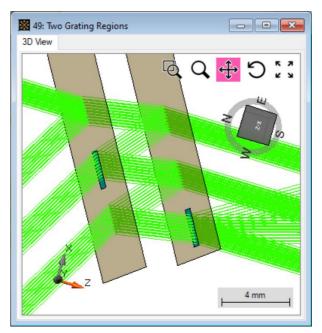
- Region definition
 - It is possible to define a diffractive grating on a given region.
 - We add a rectangular region (2.25mm side length) on 2nd surface, centered at -8.2mm along x-direction.

Edit Waveg	uide					7
	7	Solid	Surface Layouts	3		
			Surface Name	Edit	Info	<u>`````````````````````````````````````</u>
Geome Chann	etry / nels	1	Plane Interface	Edit Surface Layout	Surface layout o	containing 1 regions.
1	2 Plane Interface / Edit Surface layout containing 1 regions.				containing 1 regions.	
Positio Orientz						
Str Fi Edi	t Grating F	Region				×
			annels Grating			
- ←	🖺 🖻		Q	S	opectral Domain	Region Name Square Region
Pro Cł						Region Type Rectangular Region
		_	rotated Rectangle			
	Center Width	r X [-8.2 mm	Center Y Height	0 mm 2.25 mm	
	Width			p Aspect Ratio	2.25 mm	
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						× funul
V	/alidity: 🕑					OK Cancel Help

- 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 2µm period, and specified diffraction coefficients as
 - T0 = 10%
 - T+1 = 60%
 - T+2 = 10%.

Edit Waveguide						2	
1	Solid	Surface Layouts	8			1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-	
		Surface Name	Edit	Info			
Geometry / Channels	1	Plane Interface	Edit Surface Layout	Surface layout co	ntaining 1 regions	s. }	
	2	Plane Interface	Edit Surface Layout	Surface layout co	ntaining 1 regions	s. 7	
Position / Orientation							
Str Fi Edit Gratin	ng Region						×
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₹				0			
		nvariant in y-Directio	on)	 3D Grating 			
Pro Grating	Period	L	1,	m			
Orienta	ation (Rota	ation about z-Axis)		0°			
Order S	election	Efficiencies					
● Co	nstant			mmable		O From Re	al Gratings
Over	all Transr	mission	80 %		Overall Reflect	ion	20 %
Fro	om Front S	ide		From Back S	ide		
	Order	Efficiency		Order	Efficiency		
	0 +1		10 % 60 %				
	+1		10 %				
Validity:	0				OK	Cancel	Help

- 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 2µm period, and specified diffraction coefficients as
 - T0 = 10%
 - T+1 = 60%
 - T+2 = 10%.



Region on surface 1: -/+ channel on Region on surface 2: +/+ channel on [with T0, T+1, T+2 diffraction orders]

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	 Non-Sequential Ray Tracing Analysis of Glass Plate Modeling of Etalon with Planar or Curved Surfaces Optimizing Waveguide Outcoupling Gratings for Uniform Multiple Channels