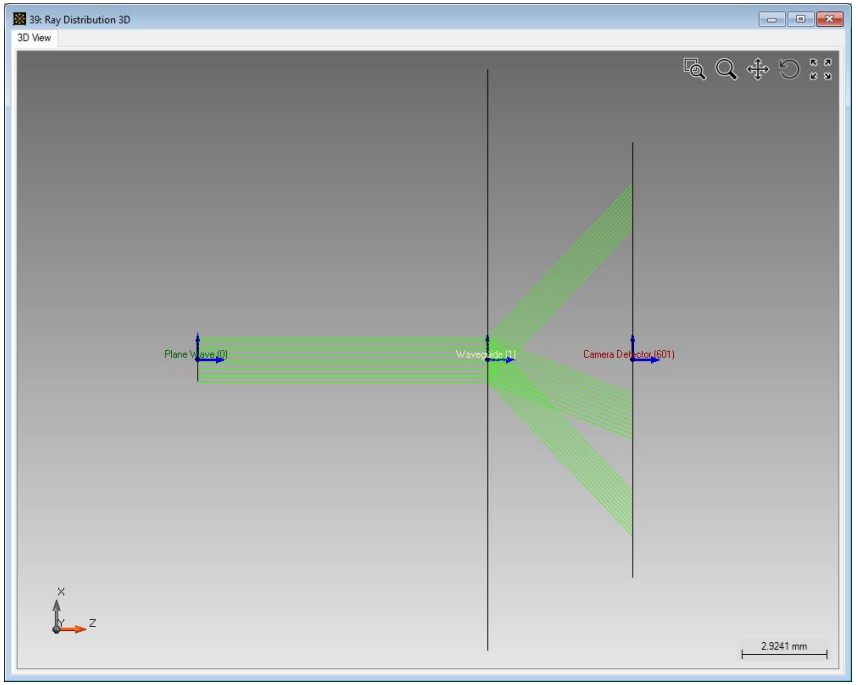
Specification of Diffraction Orders for Grating Regions

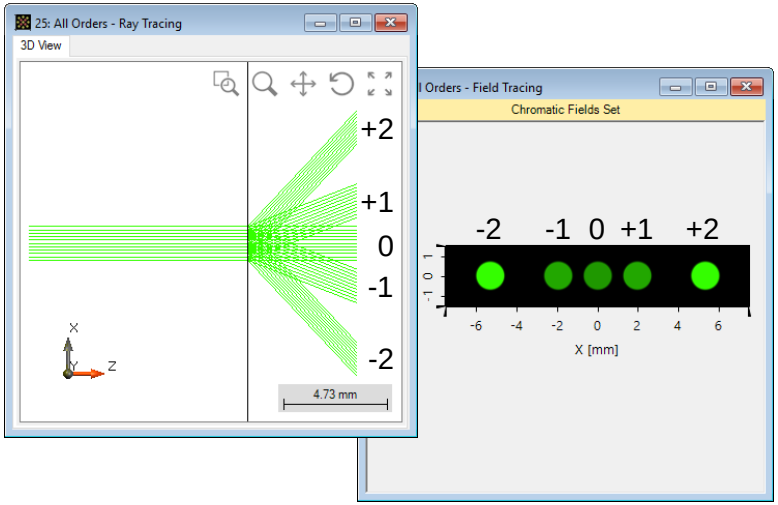
Abstract



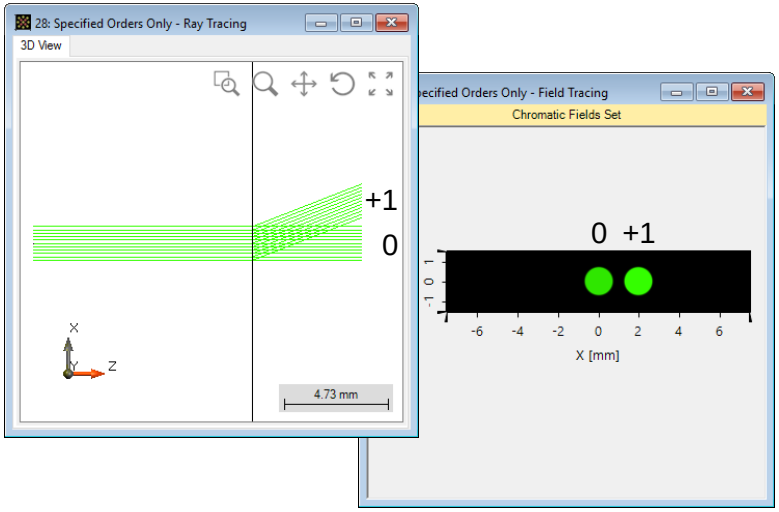
For the configuration of waveguide layouts VirtualLab offers the waveguide component. Within this component it is possible to define an arbitrary set of grating regions per surface. Per grating region several parameters can be defined, e.g. geometry of the region, grating parameters. In each grating region it is possible to specify a set of selected orders. In advanced a propagation strategy of the order to be propagated can be selected. This use case will discuss the user friendly interface to select grating orders which shall be handled during the simulation.

Modeling Task

- how to specify the diffraction orders for a grating region and the consequences in ray/field tracing.



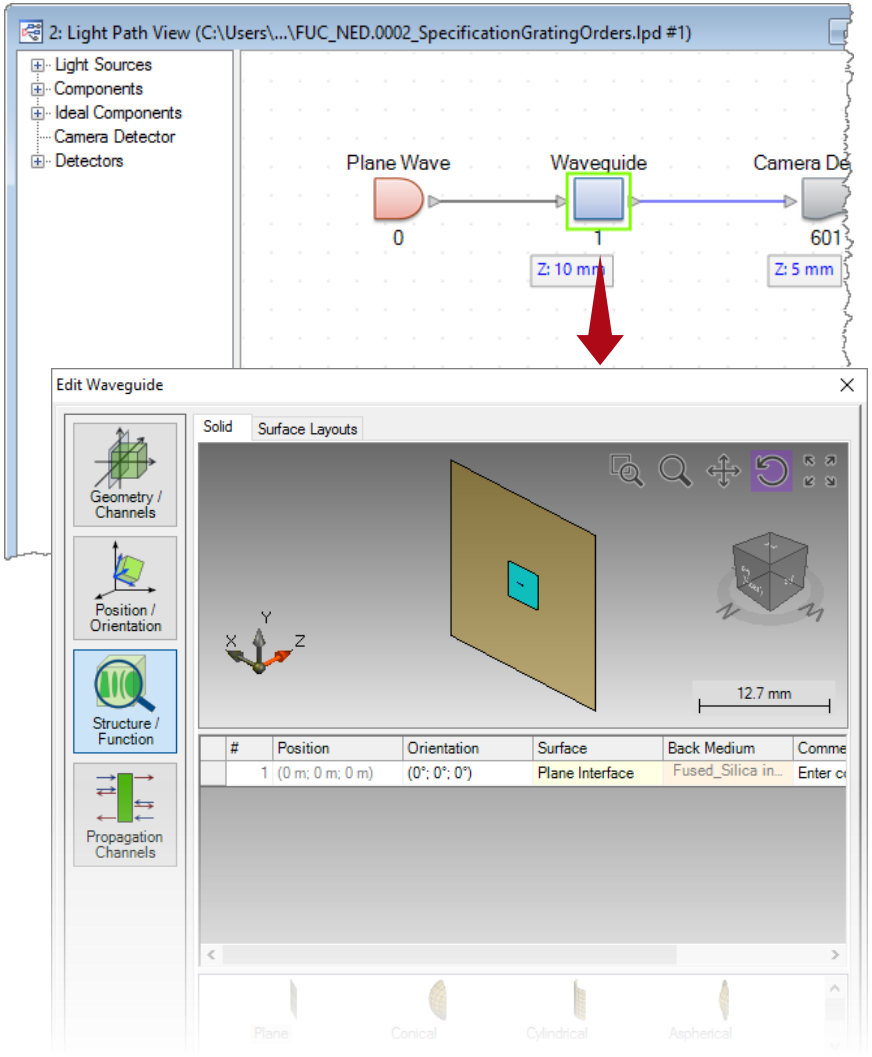
With all propagating orders
(left: ray tracing; right: field tracing)



With only specified (0th and +1st) orders
(left: ray tracing; right: field tracing)

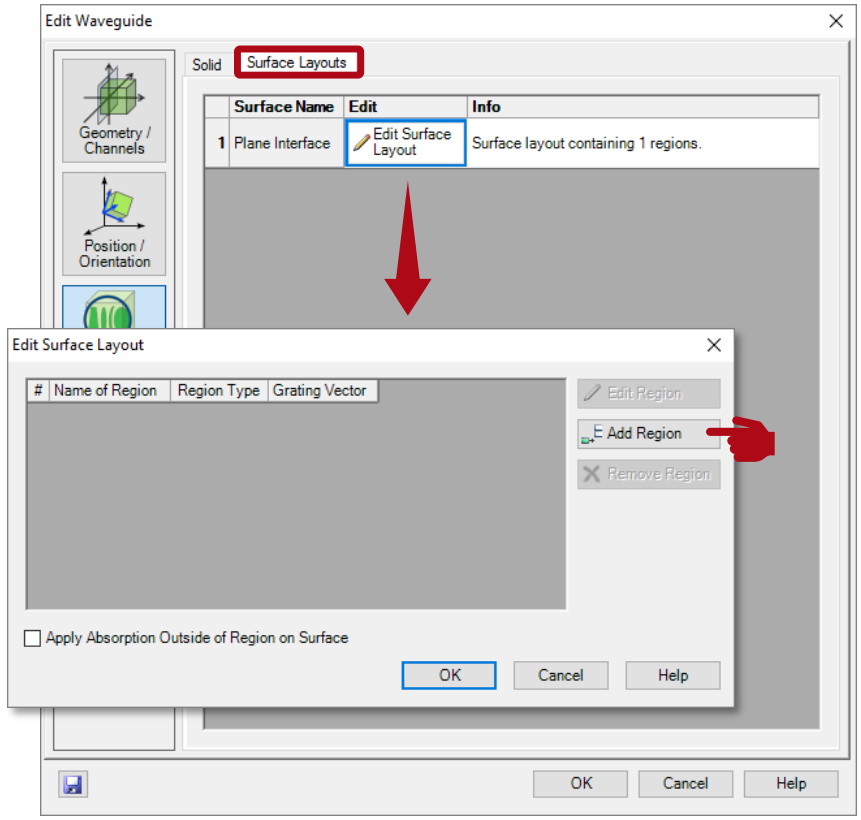
System Construction

- Initialization
  - For illustration purposes, we work with a single plane interface, i.e., we just consider one surface of the waveguide.



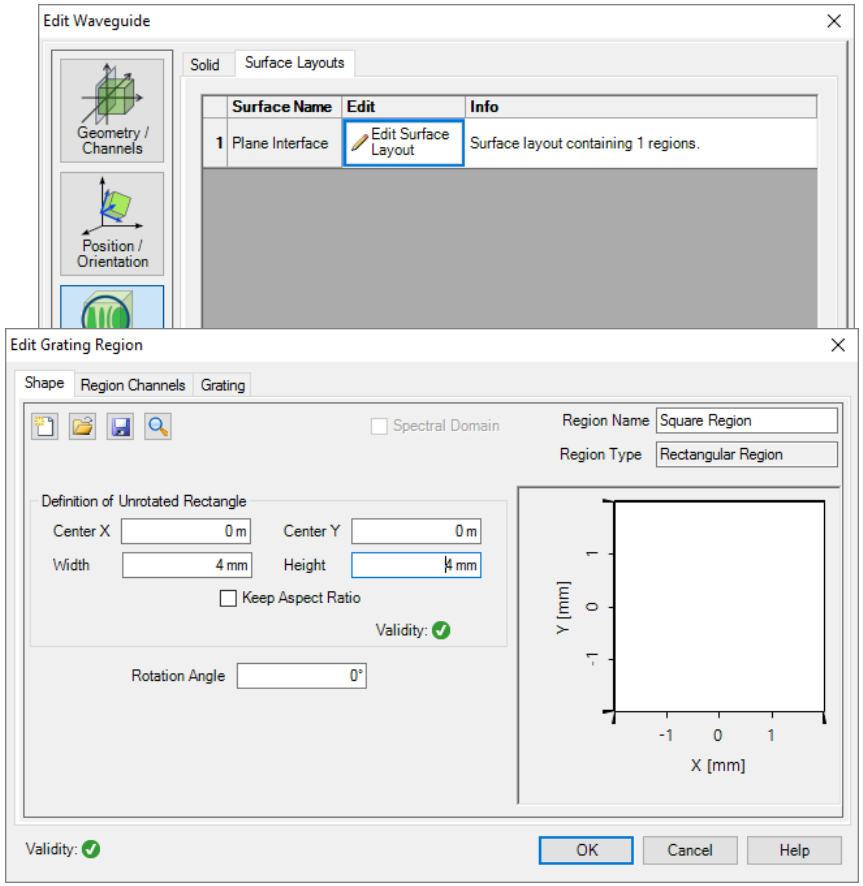
Region Definition

- Initialization
  - For illustration purposes, we work with a single plane interface, i.e., we just consider one surface of the waveguide.
  - Create a rectangular region on the plane interface by clicking on *Add Region.*



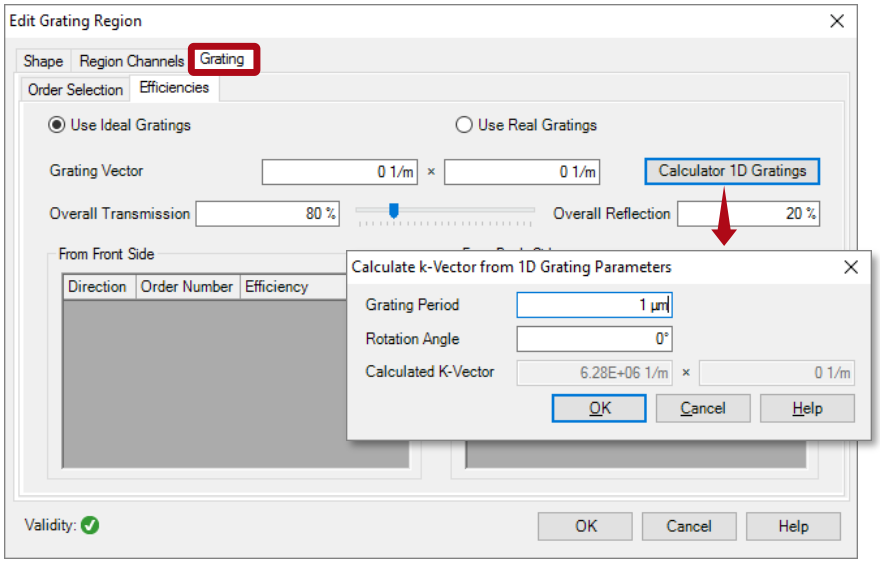
Region Definition

- Initialization
  - For illustration purposes, we work with a single plane interface, i.e., we just consider one surface of the waveguide.
  - Create a rectangular region on the plane interface by clicking on Add Region.
  - Define a rectangular region with a size of e.g. 4x4 mm.



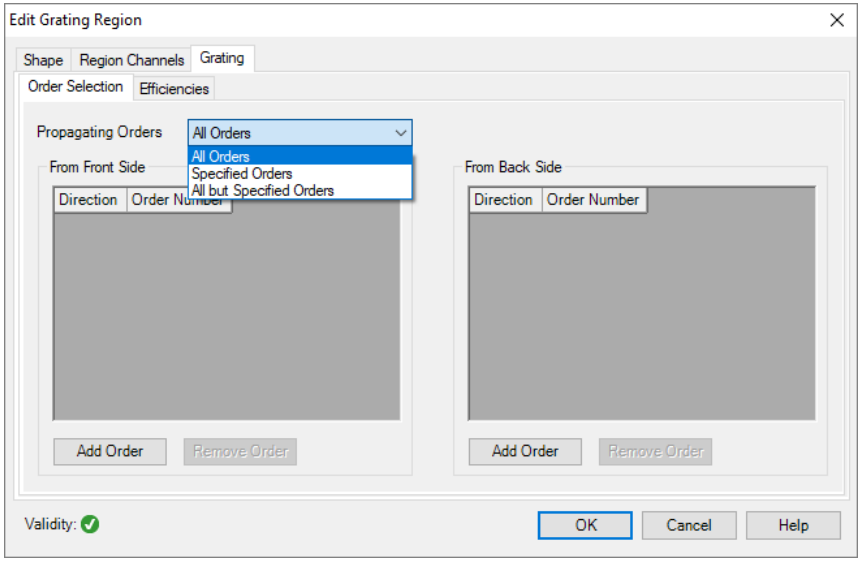
Grating Configuration

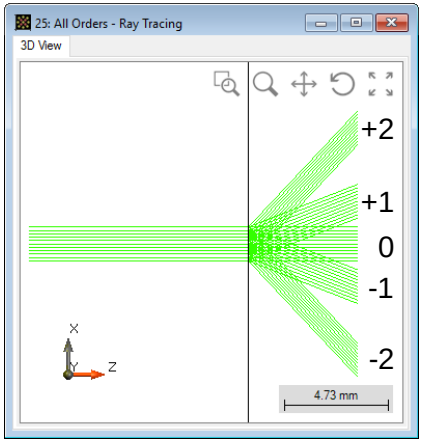
- Grating definition
  - Define an ideal linear grating with period of 1 µm by using *Calculator 1D Gratings* (five propagating diffraction orders for 532 nm wavelength in fused silica).

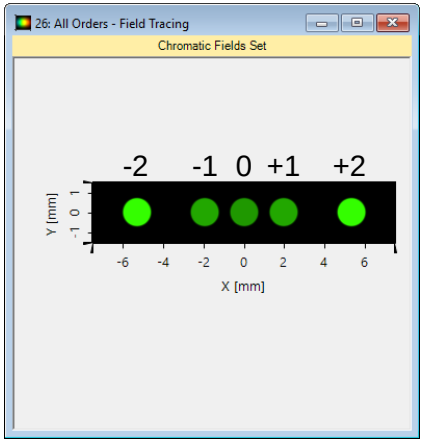


Grating Configuration and Simulation

- Grating definition
  - Define an ideal linear grating with period of 1 µm by using Calculator 1D Gratings (five propagating diffraction orders for 532 nm wavelength in fused silica).
  - Under the tab *Order Selection*, follow default setting with *All Orders* at first.
  - Run ray and field tracing simulations.

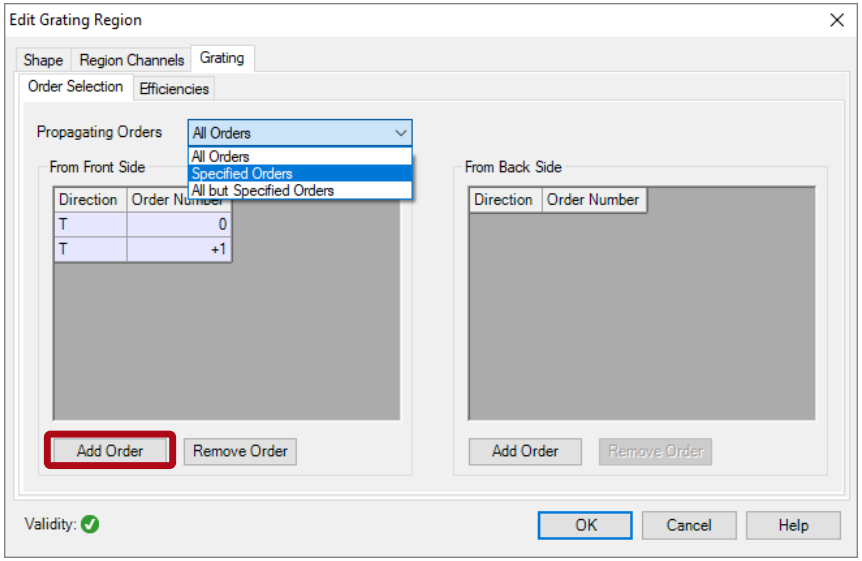






Grating Configuration

- Grating definition
  - Define an ideal linear grating with period of 1 µm by using Calculator 1D Gratings (five propagating diffraction orders for 532 nm wavelength in fused silica).
  - Under the tab Order Selection, change to *Specified Orders*, and click on *Add Order* to include e.g. the 0th and 1st transmission orders.



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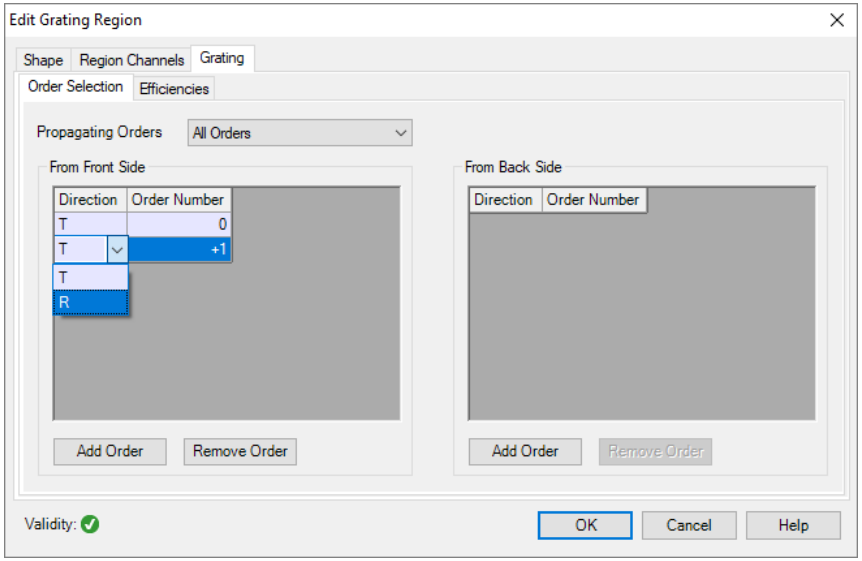
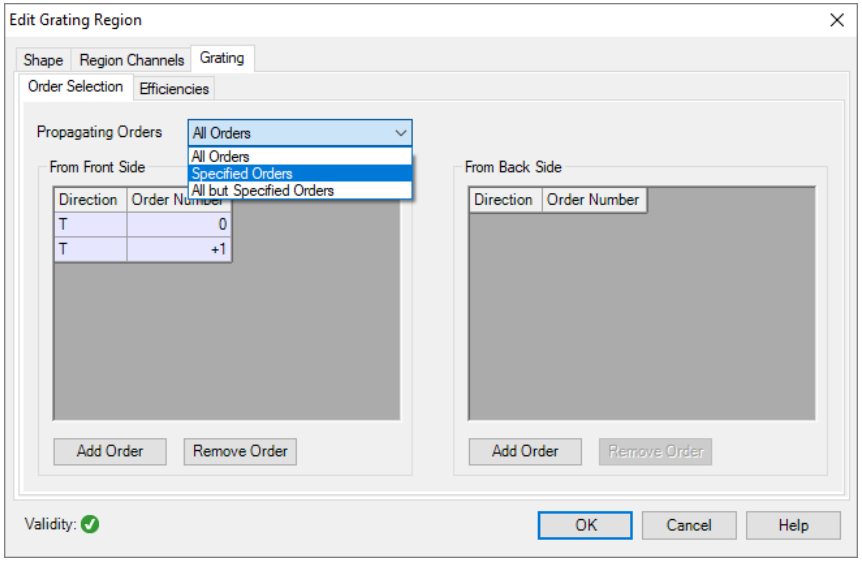
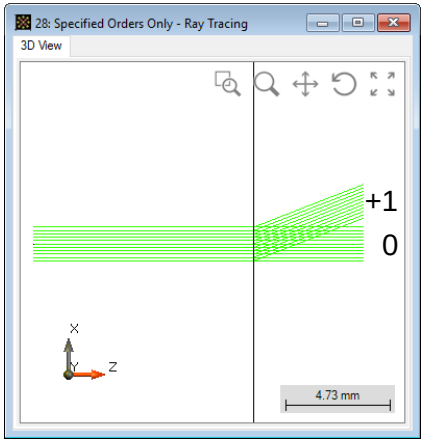


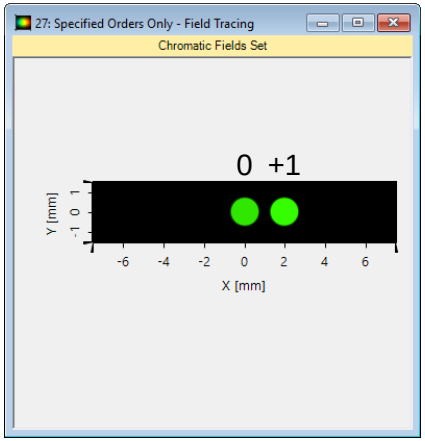
The direction of diffraction orders i.e. transmission (T) or reflection (R) can be specified by using the dropdown option.

Grating Configuration and Simulation

- Grating definition
  - Define an ideal linear grating with period of 1 µm by using Calculator 1D Gratings (five propagating diffraction orders for 532 nm wavelength in fused silica).
  - Under the tab Order Selection, change to *Specified Orders*, and click on *Add Order* to include e.g. the 0th and 1st transmission orders.
  - Run ray and field tracing simulations.

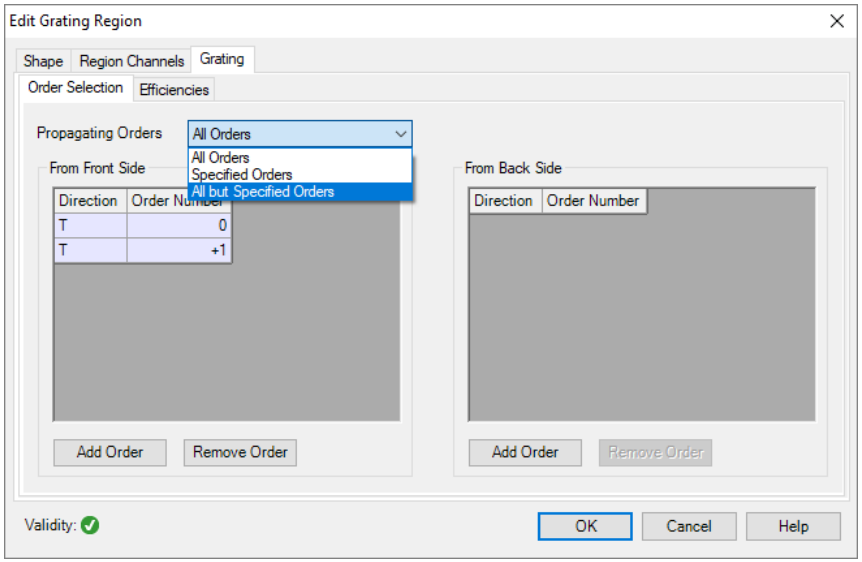


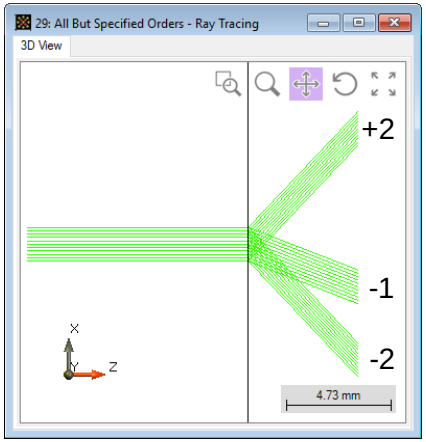


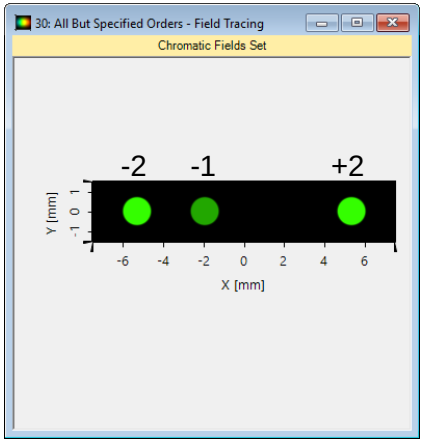


Grating Configuration and Simulation

- Grating definition
  - Define an ideal linear grating with period of 1 µm by using Calculator 1D Gratings (five propagating diffraction orders for 532 nm wavelength in fused silica).
  - Next, we change to *All but Specified Orders.*
  - Run ray and field tracing simulations.







Document Information

title	Specification of Diffraction Orders for Grating Regions
version	1.0
VL version used for simulations	7.0.3.4
category	Feature Use Case