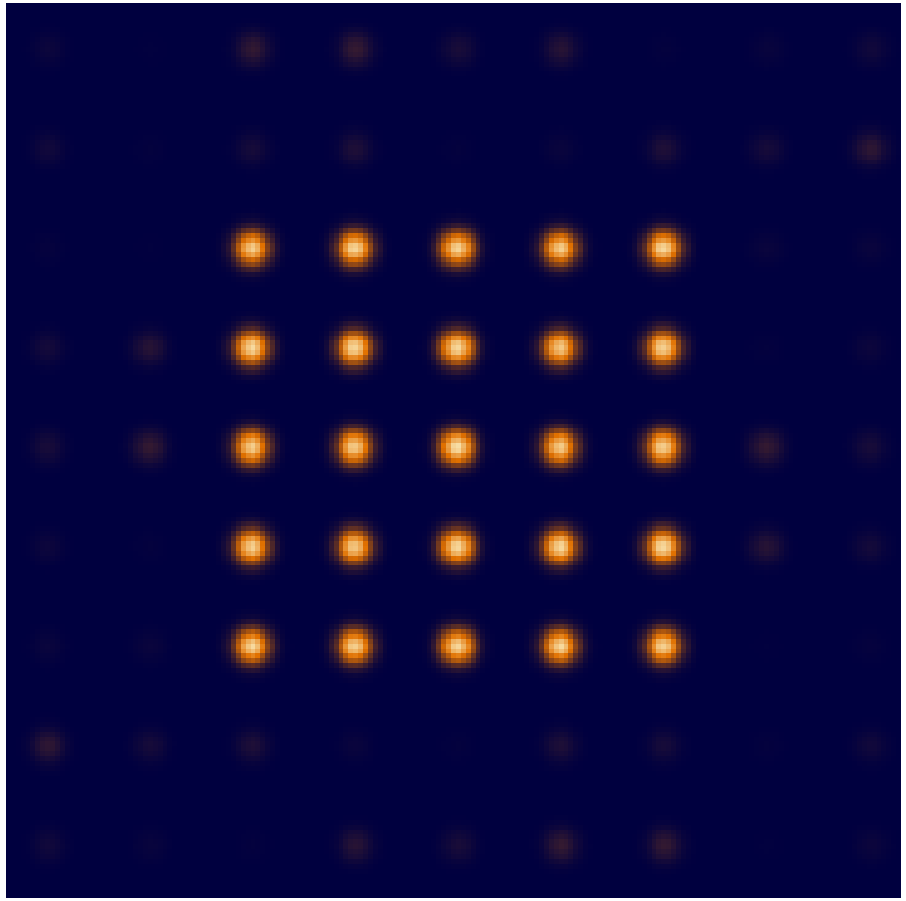
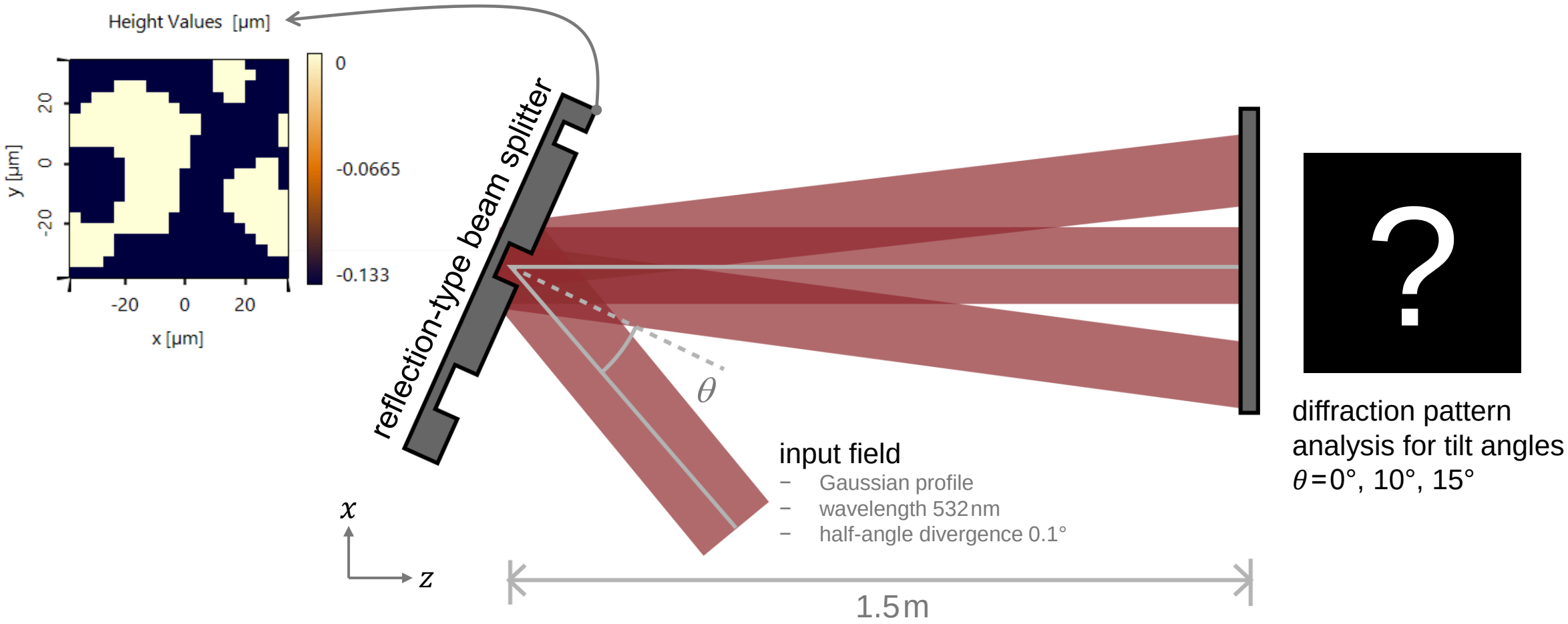
Diffraction Pattern Calculation from a Reflection-Type Diffractive Beam Splitter

Abstract



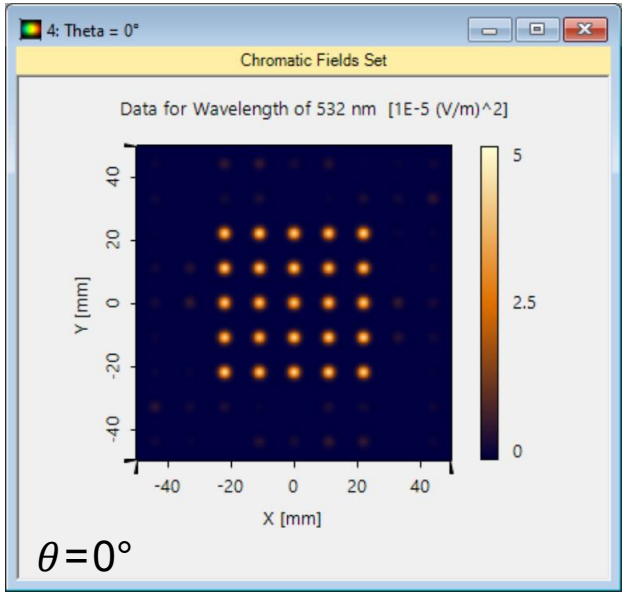
Most diffractive beam splitter is designed with the normal incidence assumption. More specifically, the structure design from transmission function, which is achieved by using Iterative Fourier Transform Algorithm, is done by using the thin element approximation under normal incidence. However, in the practical situation, to avoid the block of reflection beam when using a reflection-type beam splitter, the splitter must be rotated. This use case demonstrates how the diffracted pattern changes when the beam splitter is tilted for different angles.

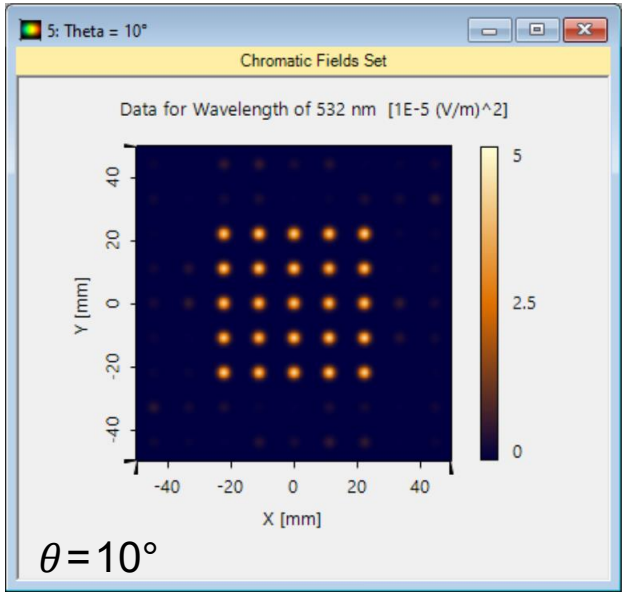
Modeling Task

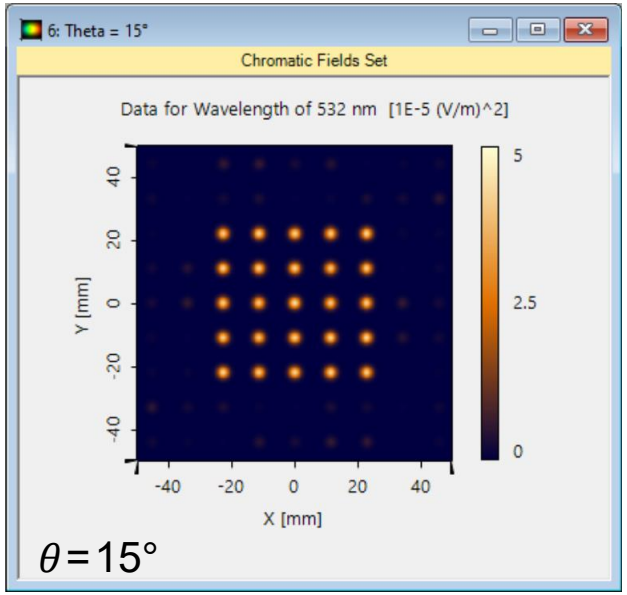


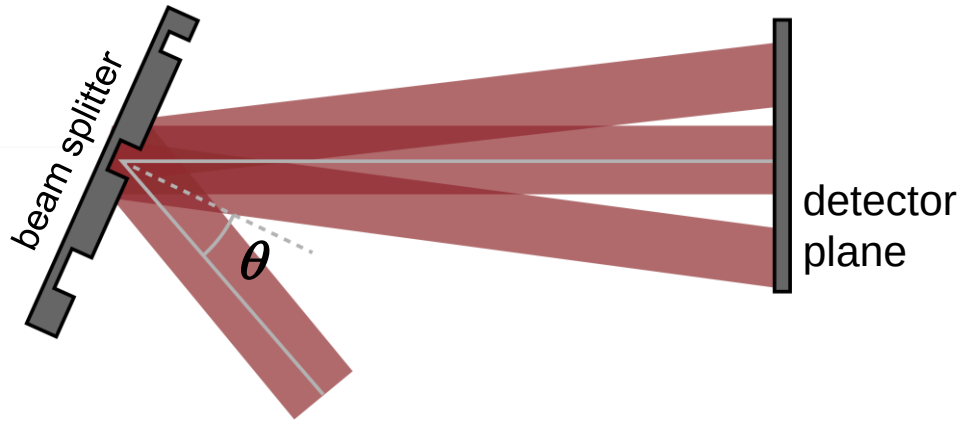
diffraction pattern analysis for tilt angles $\theta = 0°, 10°, 15°$

Diffraction Patterns in Detector Plane

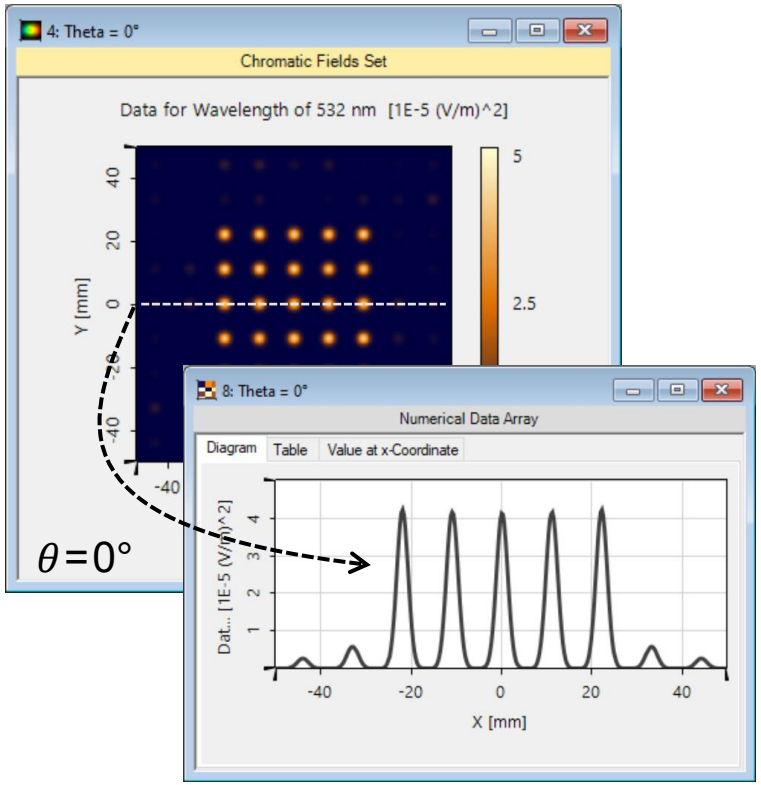


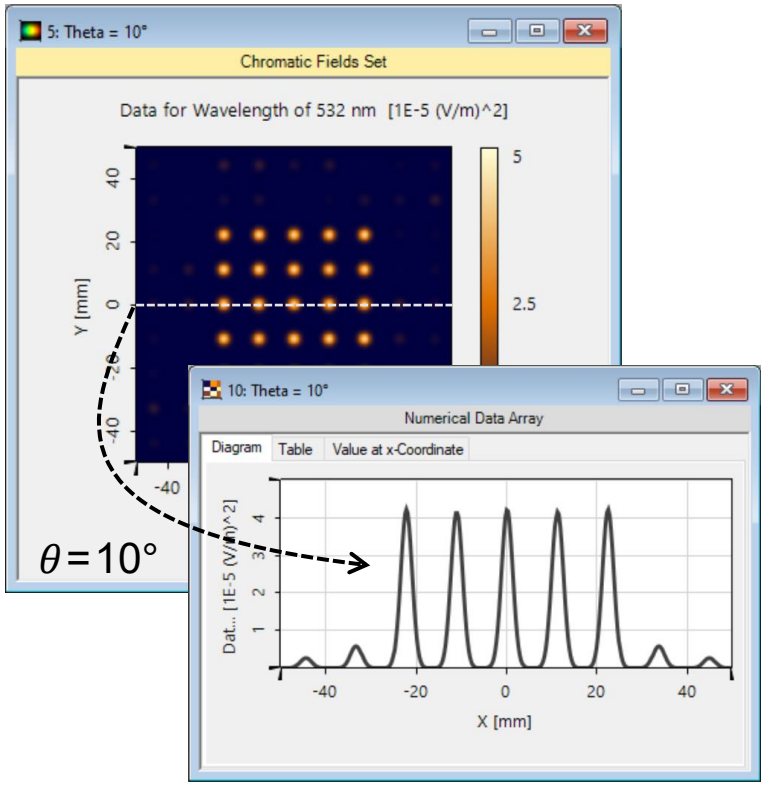


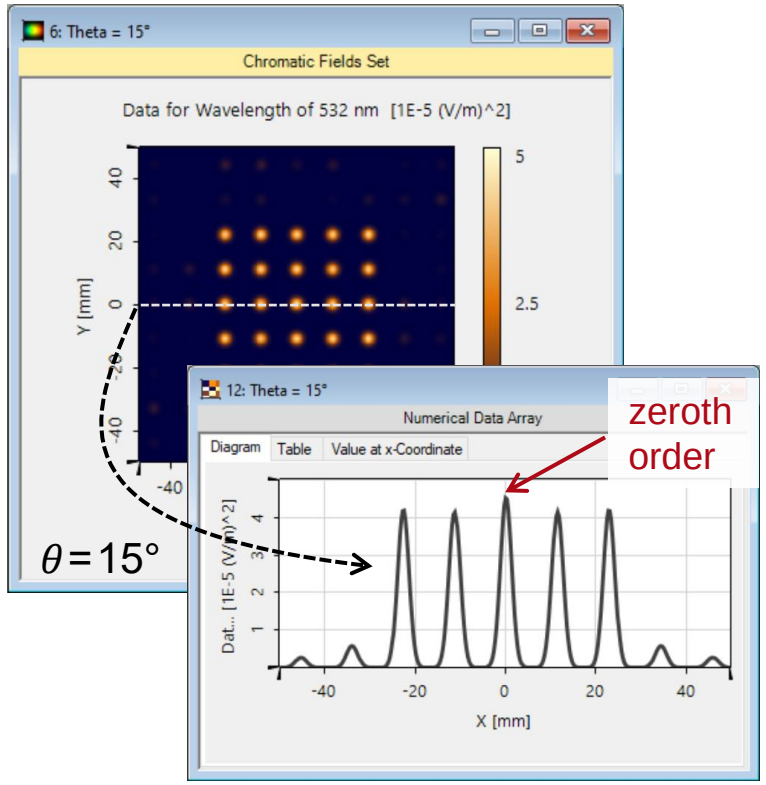




Diffraction Pattern in Detector Plane



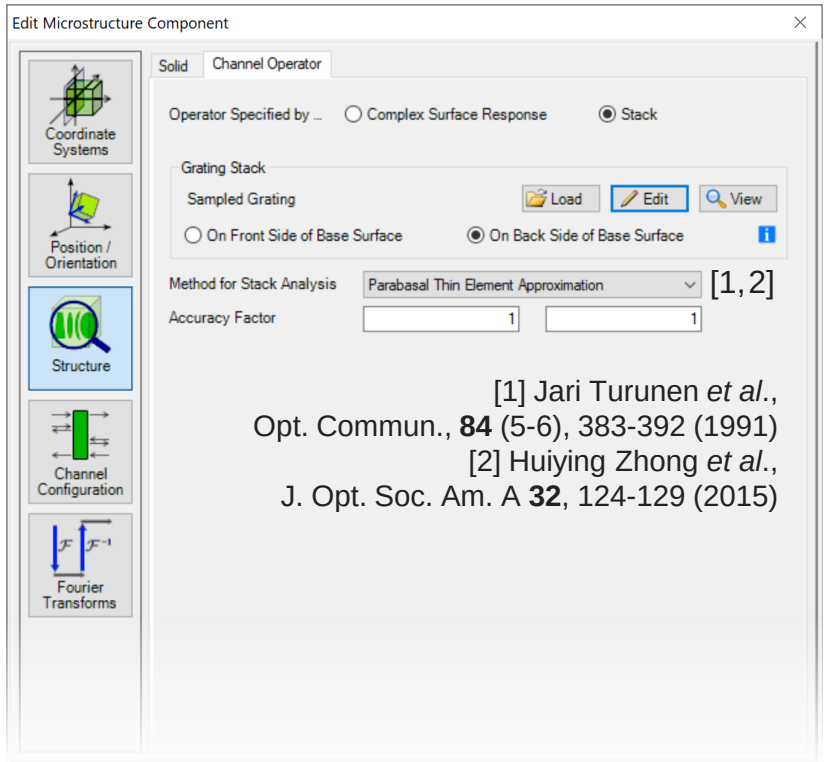




The beam splitter is designed under normal incidence, and for small angle (< 10°) it delivers uniformly split diffraction orders.

The efficiency of zeroth order exceeds other orders, when θ increases to 15°. Such situation shall be avoided in practice.

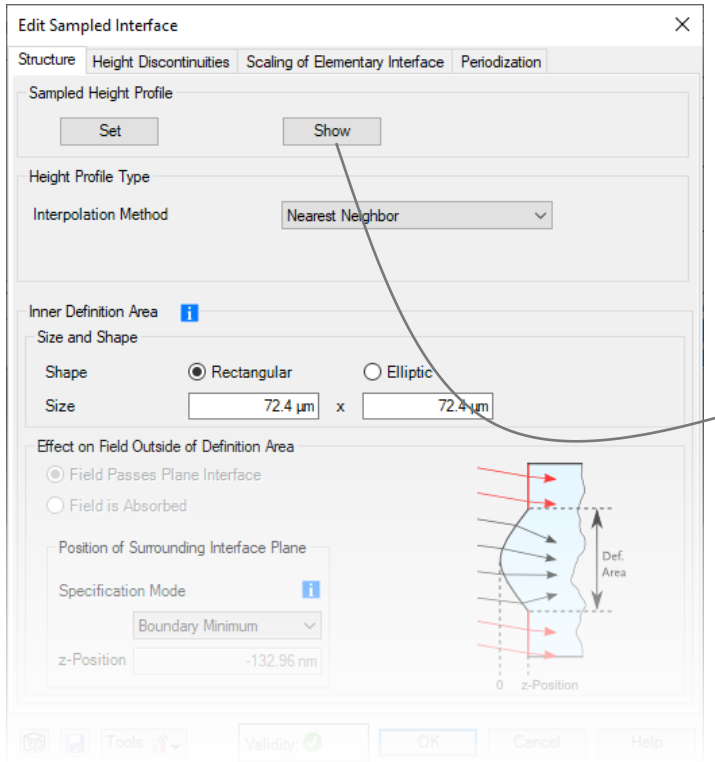
Peek into VirtualLab Fusion



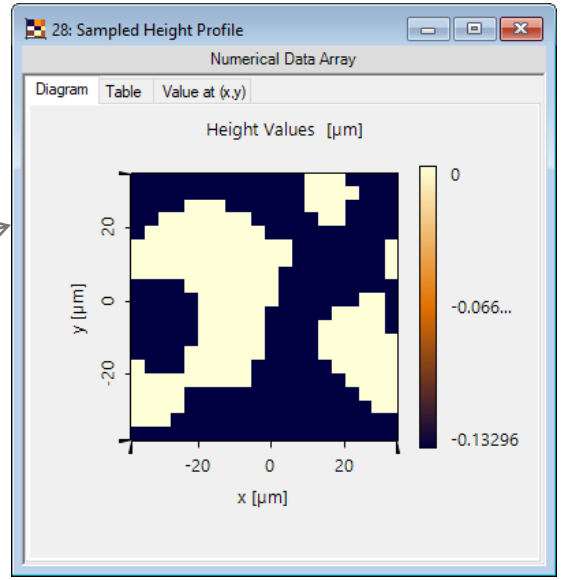
[1,2]

[1] Jari Turunen *et al.*, Opt. Commun., **84** (5-6), 383-392 (1991)
[2] Huiying Zhong *et al.*, J. Opt. Soc. Am. A **32**, 124-129 (2015)

Microstructure Component is used to model the diffractive beam splitter.

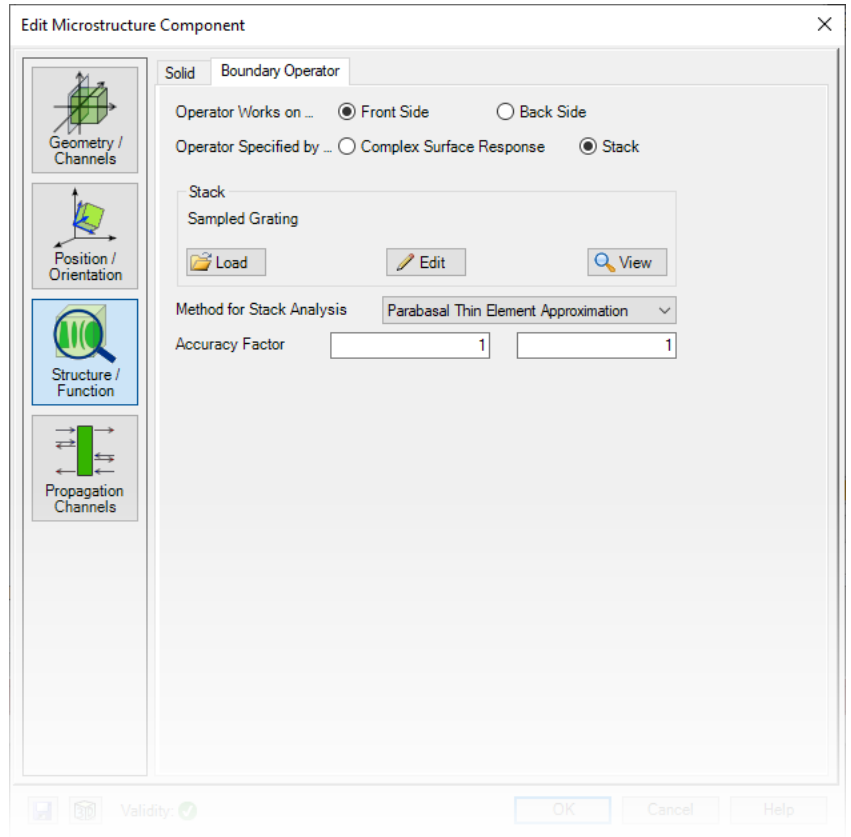


The microstructure can be defined by imported data.

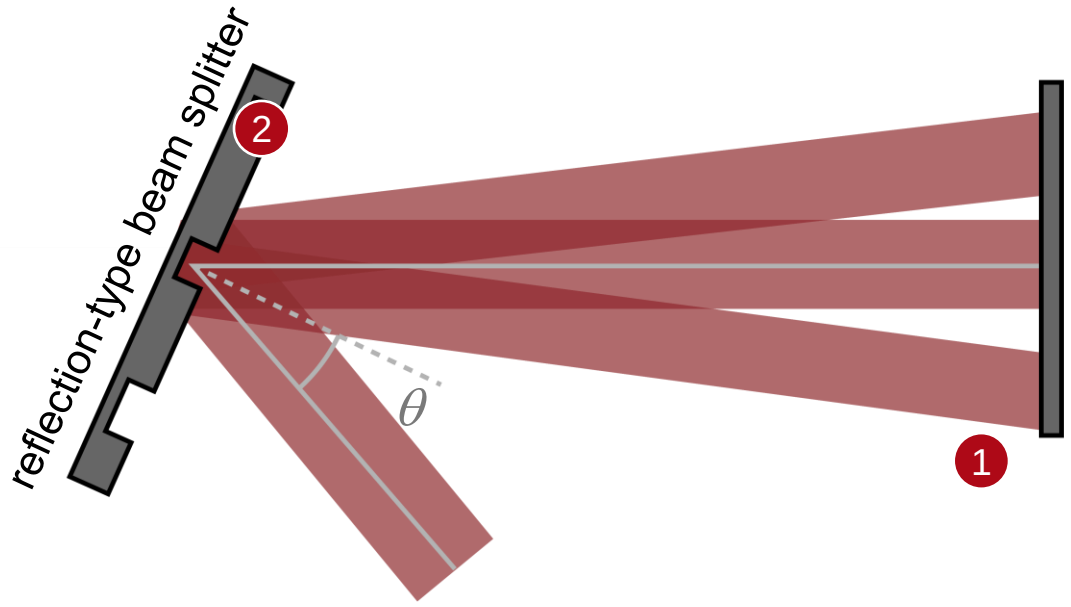


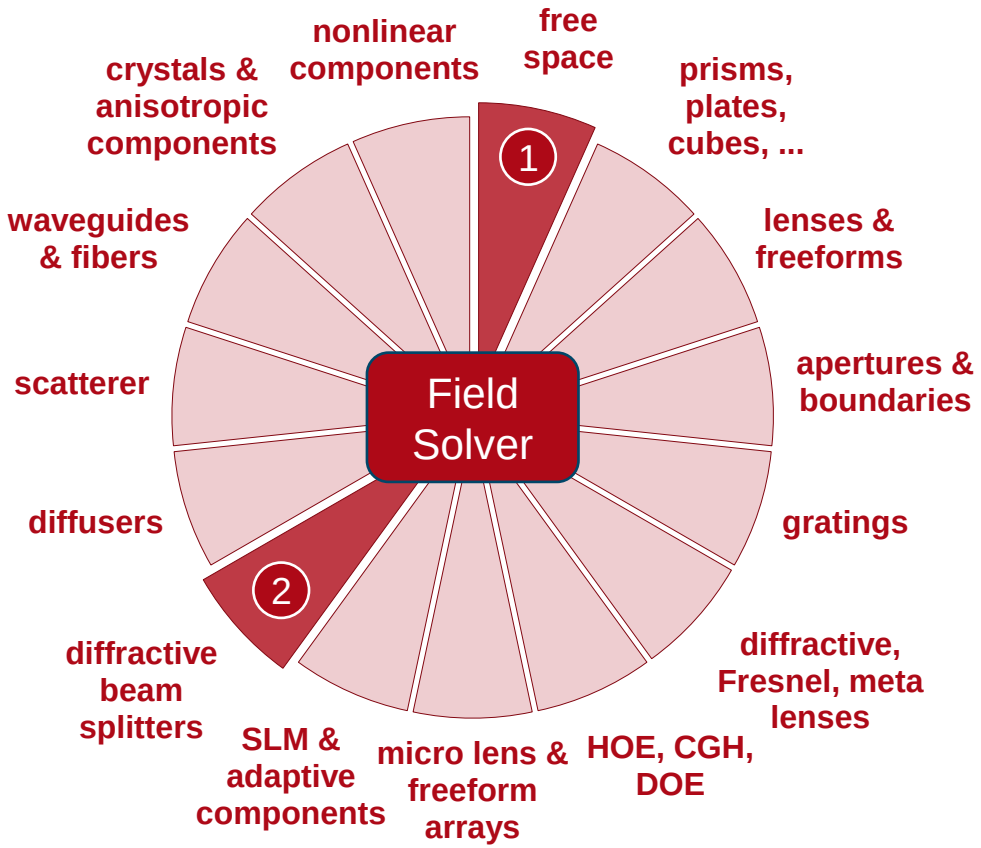
Workflow in VirtualLab Fusion

- Set up input Gaussian field
  - Basic Source Models [Tutorial Video]
- Set the position and orientation of components
  - LPD II: Position and Orientation [Tutorial Video]
- Set the Microstructure Component
- Set the Camera Detector
  - Usage of Camera Detector [Use Case]



VirtualLab Fusion Technologies





Document Information

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software version	2020.1 (Build 1.200)
category	Application Use Case
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