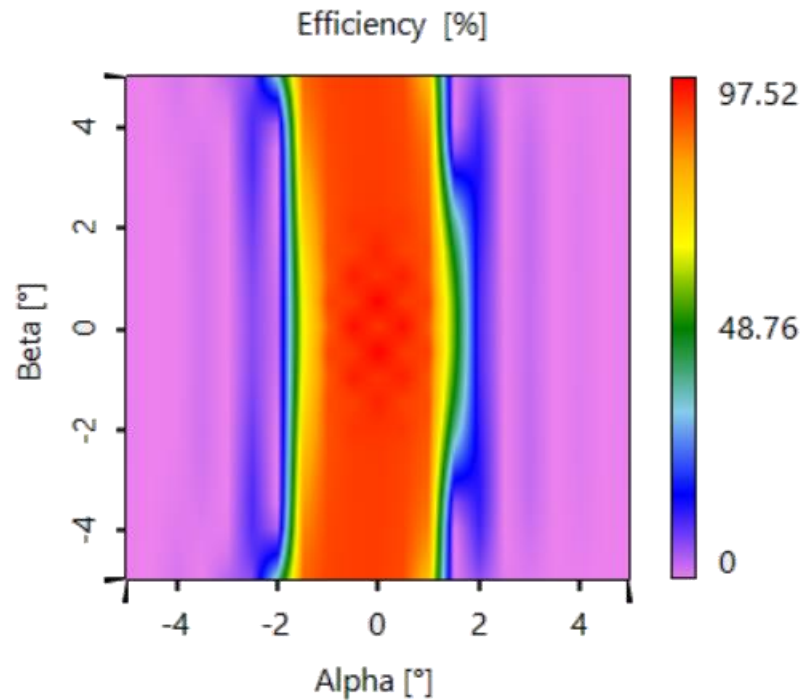


Diffraction Lightguide In- and Outcouple Situation using Surface and Volume Gratings

Abstract



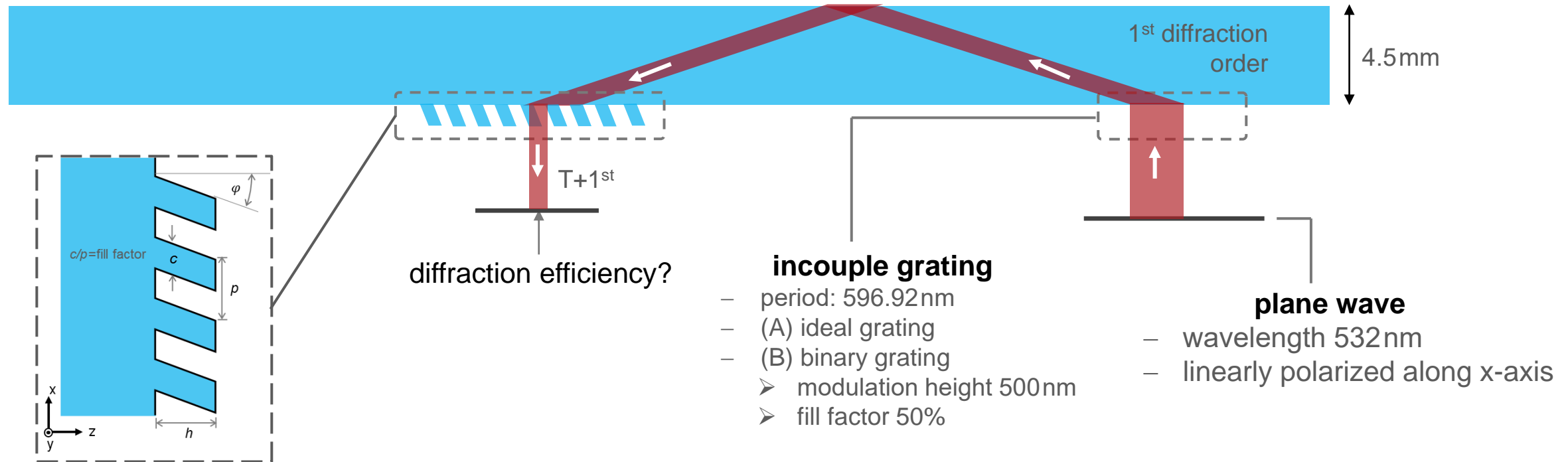
In this demo we simulate a lightguide outcouple efficiency using a slanted outcouple grating and an ideal or binary incouple grating. As a result, the sensitivity of the lightguide efficiency is analyzed regarding the thickness and the amplitude of the refractive index modulation of the volume gratings

Modeling Task of Surface Gratings

outcouple grating

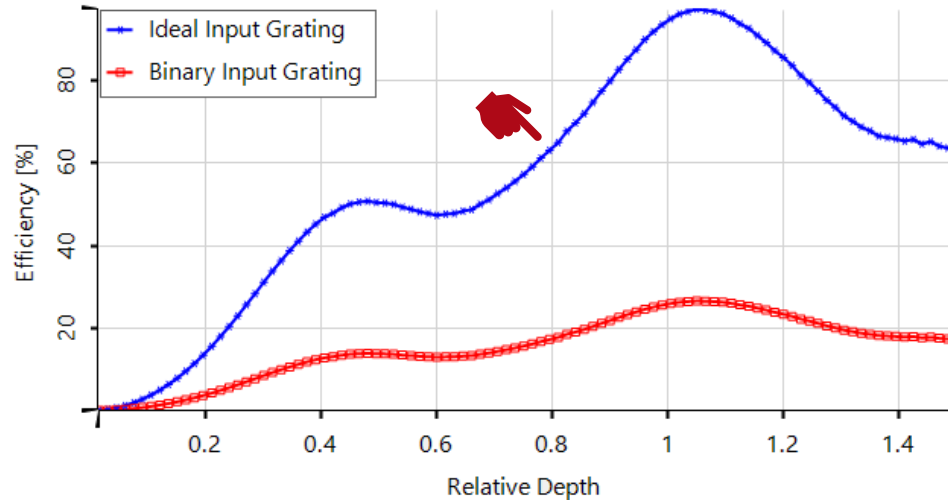
- period: 596.92 nm
- slanted grating
- relative depth
- fill factor
- slant angle

to be varied

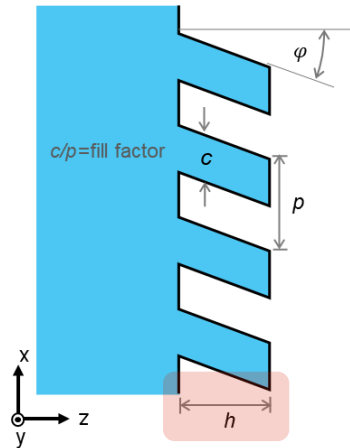


Diffraction Efficiency vs. Relative Depth

simulation of a lightguide outcouple efficiency using a slanted outcouple grating and an ideal or binary incouple grating



outcouple grating



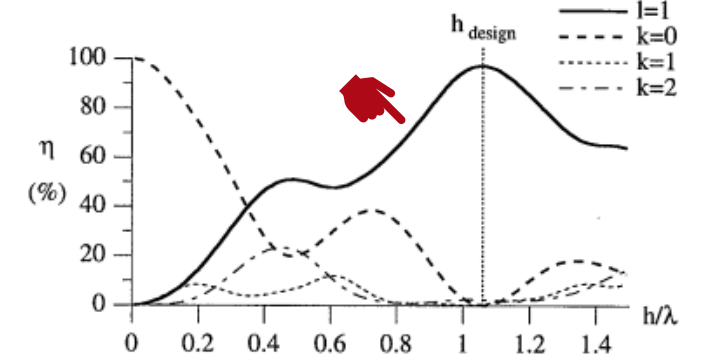
Parameter of Outcouple Grating	Value & Unit
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relative depth	to be varied
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slant angle φ	-30°
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fill factor c/p	50%
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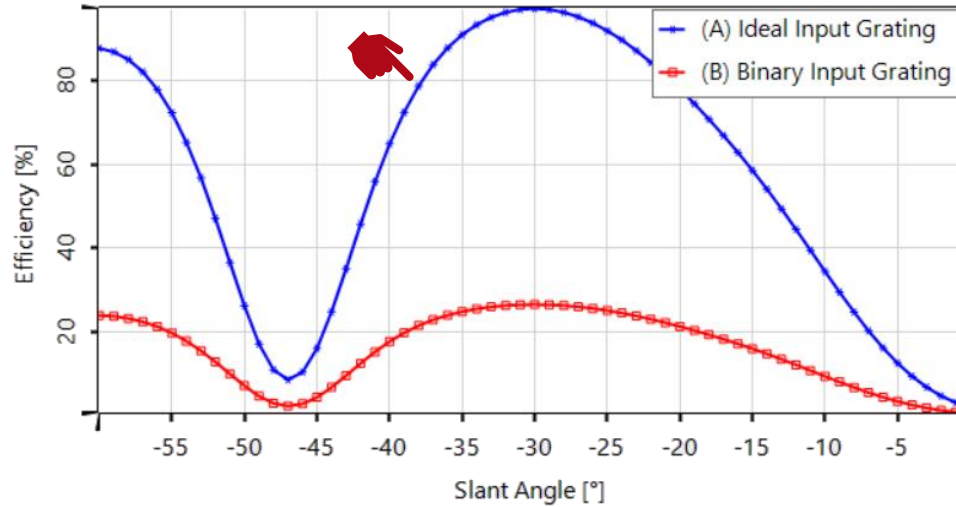
comparison to a reference simulated purely for the outcouple grating (input grating with transmission of 100%)



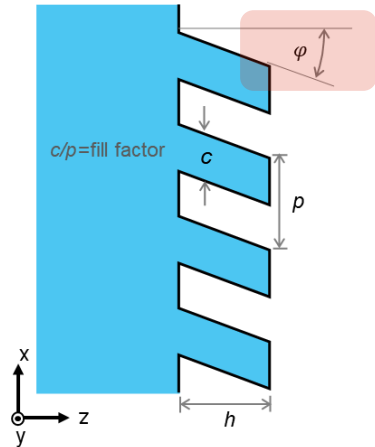
Reference: J. Michael Miller, Nicole de Beaucoudrey, Pierre Chavel, Jari Turunen, and Edmond Cambriil, "Design and fabrication of binary slanted surface-relief gratings for a planar optical interconnection," Appl. Opt. 36, 5717-5727 (1997)

Diffraction Efficiency vs. Slant Angle

simulation of a lightguide outcouple efficiency using a slanted outcouple grating and an ideal or binary incouple grating

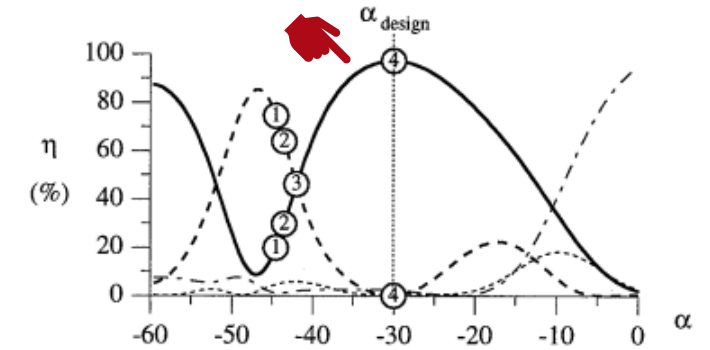


outcouple grating



Parameter of Outcouple Grating	Value & Unit
relative depth	1.058λ
slant angle φ	to be varied
fill factor c/p	50%

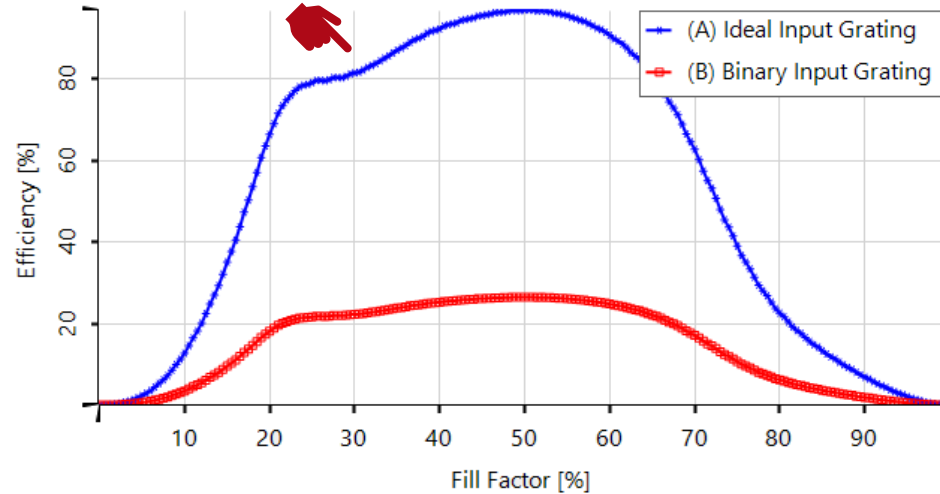
comparison to a reference simulated purely for the outcouple grating (input grating with transmission of 100%)



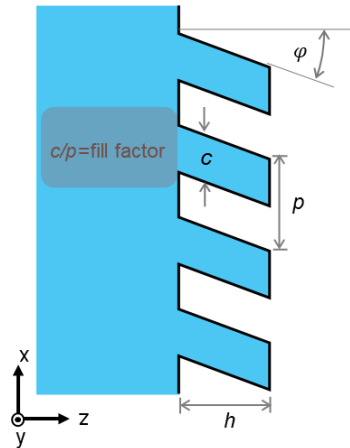
Reference: J. Michael Miller, Nicole de Beaucoudrey, Pierre Chavel, Jari Turunen, and Edmond Cambriil, "Design and fabrication of binary slanted surface-relief gratings for a planar optical interconnection," Appl. Opt. 36, 5717-5727 (1997)

Diffraction Efficiency vs. Fill Factor

simulation of a lightguide outcouple efficiency using a slanted outcouple grating and an ideal or binary incouple grating

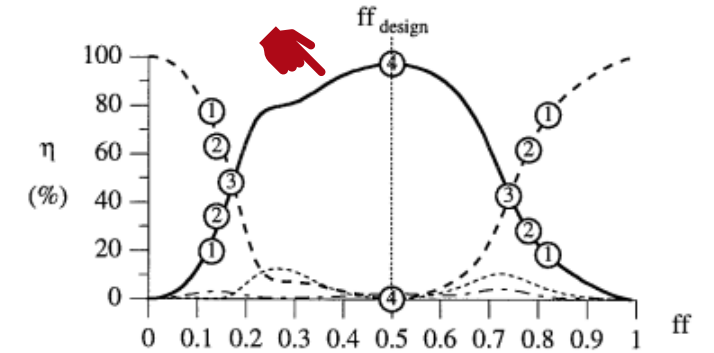


outcouple grating



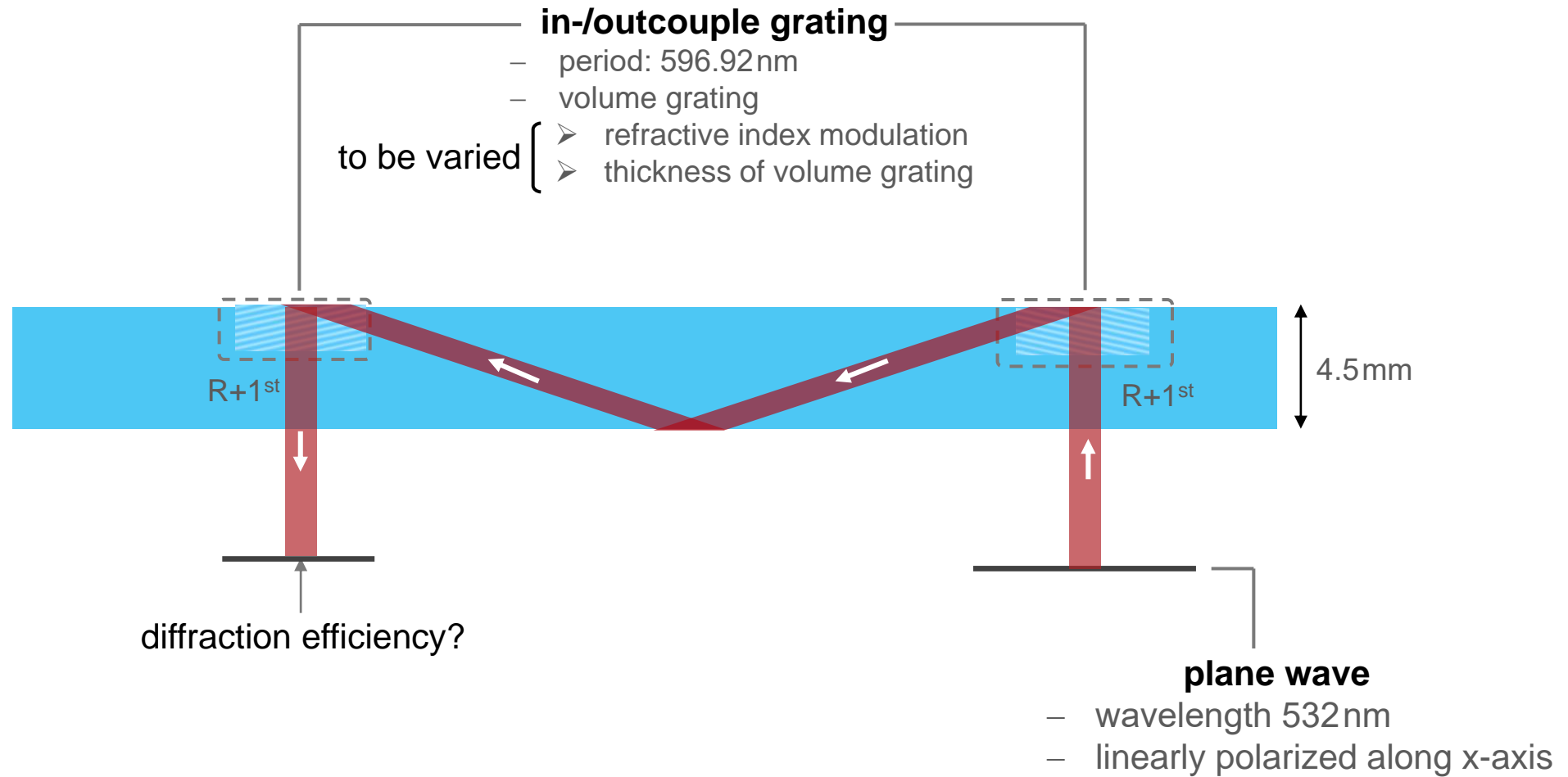
Parameter of Outcouple Grating	Value & Unit
relative depth	1.058λ
slant angle φ	-30°
fill factor c/p	to be varied

comparison to a reference simulated purely for the outcouple grating (input grating with transmission of 100%)

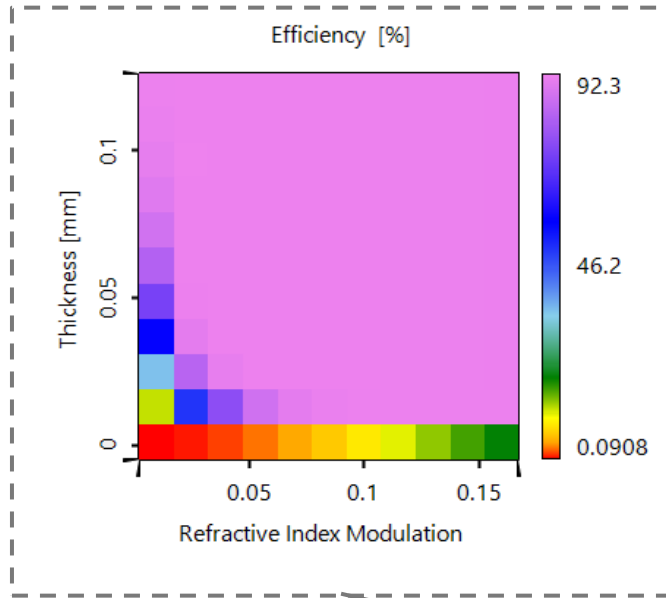


Reference: J. Michael Miller, Nicole de Beaucoudrey, Pierre Chavel, Jari Turunen, and Edmond Cambriil, "Design and fabrication of binary slanted surface-relief gratings for a planar optical interconnection," Appl. Opt. 36, 5717-5727 (1997).

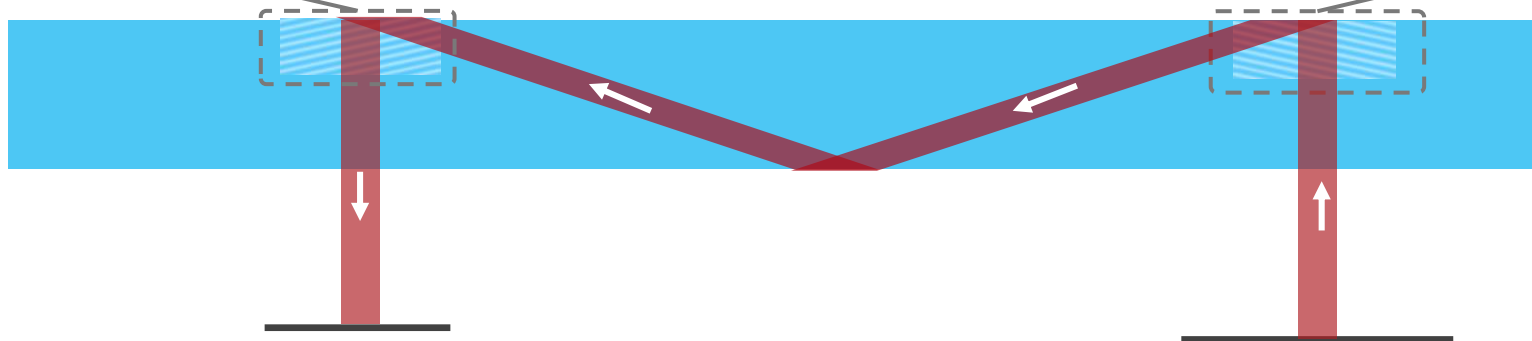
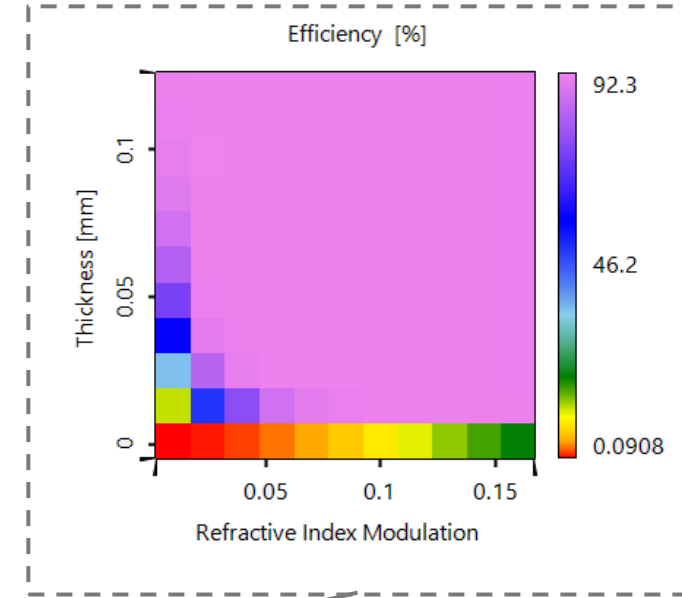
Modeling Task of Volume Gratings



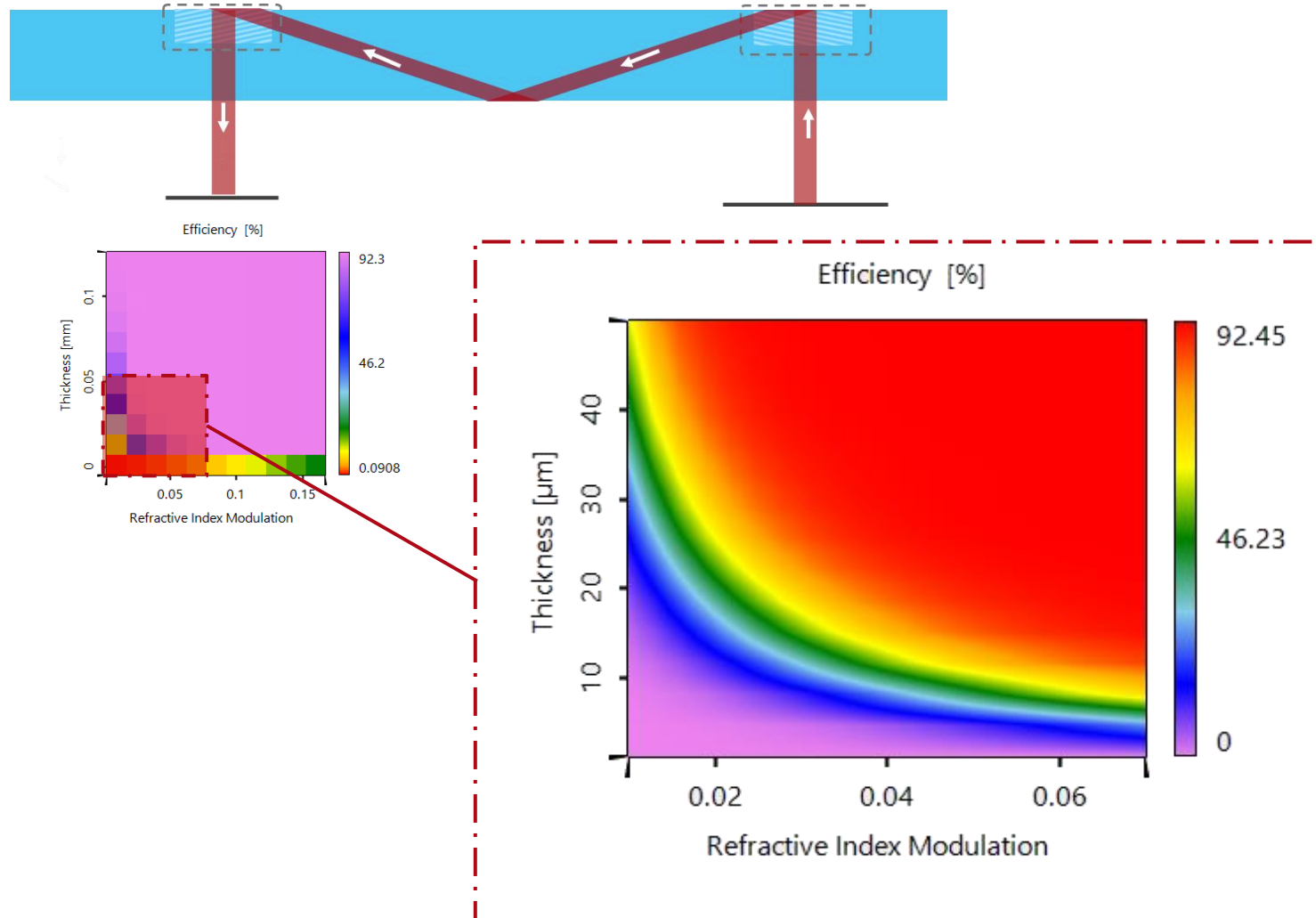
Grating Analysis: Thickness vs. Refractive Index Modulation



- first, the volume gratings are analyzed separately regarding the amplitude of the refractive index modulation and the thickness of the volume grating
- the volume gratings behave identical due to the fact, that only the period is inverted, and the shape does not differ

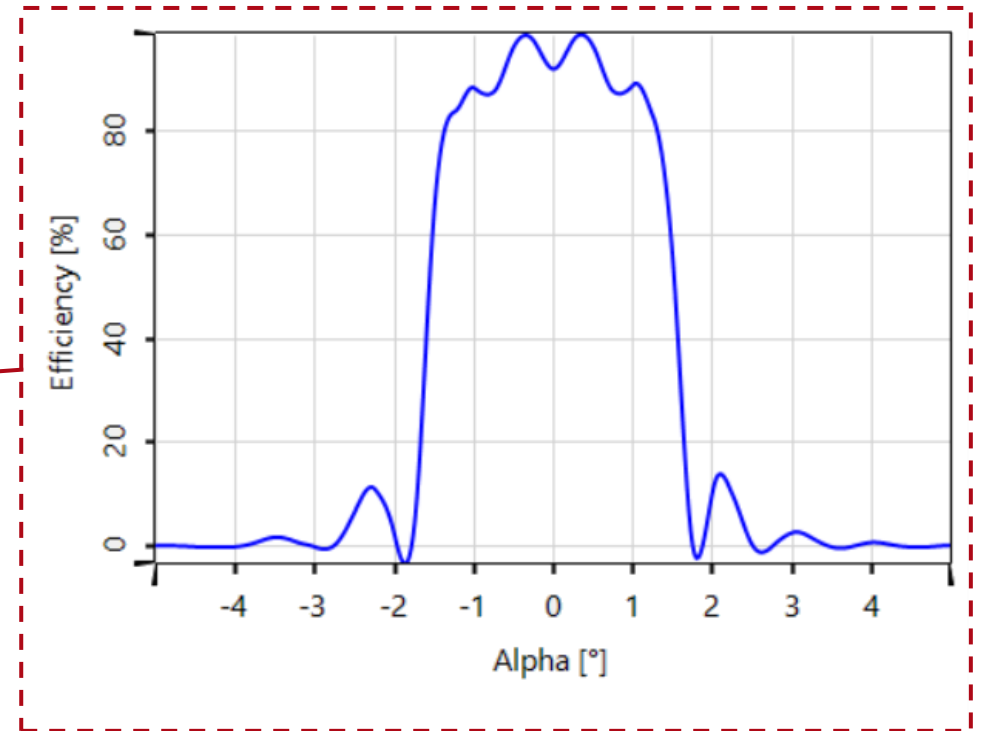
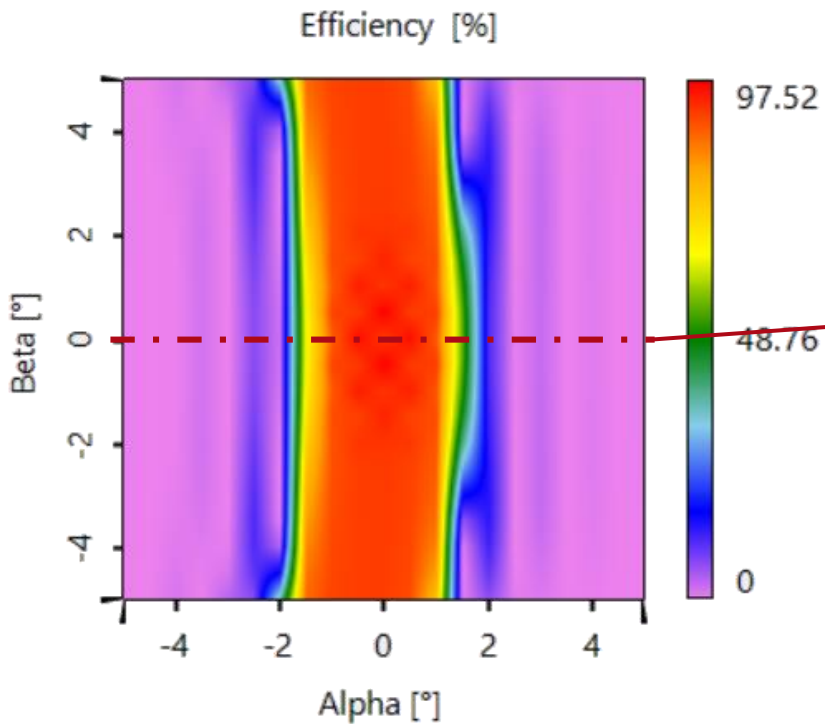
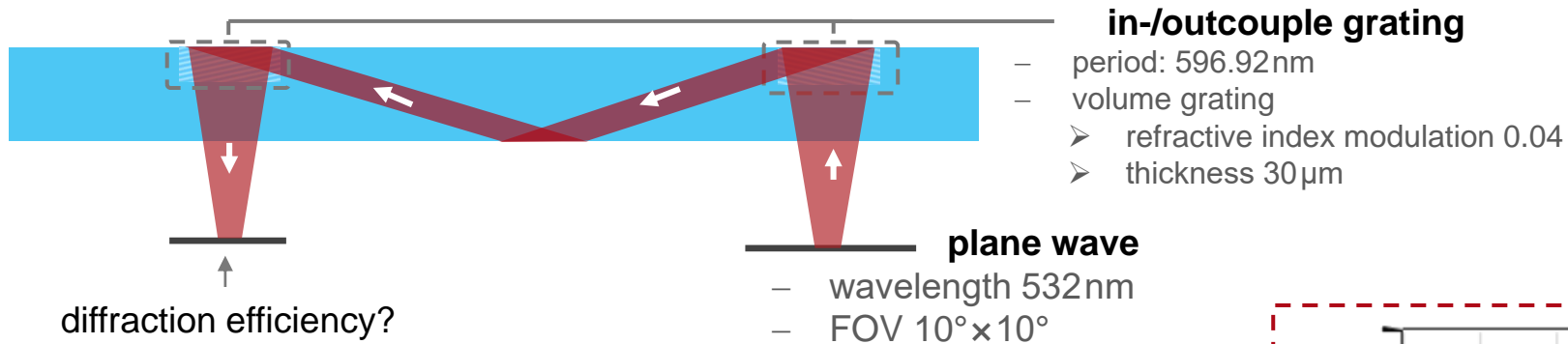


Lightguide Analysis: Thickness vs. Refractive Index Modulation



- next, the parameters of the volume gratings are coupled due to the fact, that the behavior is equivalent
- as a result, the sensitivity of the lightguide efficiency is analyzed regarding the thickness and the amplitude of the refractive index modulation of the volume gratings

Lightguide Analysis: Variation of Incidence Angle



Document Information

title	Diffraction Lightguide In- and Outcouple Situation using Surface and Volume Gratings
document code	Demo.19
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VL version used for simulations	VirtualLab Fusion Summer Release 2019 (7.6.1.18)
category	Demo
further reading	
