# Diffractive Lenses and Holographic Optical Elements (HOEs)

WYROWSKI

VirtualLab FUSION

FAST PHYSICAL OPTICS SOFTWARE

VirtualLab Fusion provides a complete workflow for diffractive-lens and HOE design. It begins with functional design, which can even be imported from e.g. Zemax OpticStudio. Furthermore, VirtualLab Fusion helps calculate the microstructured/structured lens surface, and evaluate the lens performance based on the real structure. Finally, designs can be exported for fabrication.

### **Benefits in VirtualLab Fusion**

- Complementary workflow with Zemax OpticStudio direct import of initial designs in e.g. Binary 2 surface format
- Conversion of initial designs into microstructured diffractive lens surfaces
- Modeling of actual microstructured surfaces with with local application of vectorial modeling with FMM/ RCWA and all diffraction orders considered
- Export of diffractive lens structures for fabrication and tolerance analysis



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#### Import of Binary 2 Surface from Zemax OpticStudio

- Via system import, VirtualLab Fusion can directly take over the initial design from Zemax OpticStudio in Binary 2 format.
- Imported diffractive lenses can be modified, and used alongside other components.
- Modeling of diffractive lenses can be either done either in an idealized manner, or with real diffractive structures.

#### Real Microstructure Modeling

- VirtualLab Fusion calculates the actual lens surface structure from its functional description.
- The actual structure can be either continuous or quantized in discrete phase values.
- Modeling of real diffractive lens structures is based on the local linear grating model.

## Inclusion of All Diffraction Orders

- In contrast to most other software, VirtualLab Fusion is capable of taking all diffraction orders into account (not just the desired/working order).
- Based on the real surface structure, the diffraction efficiency can be computed as well.
- Optimization of real diffractive lenses is possible by varying its structure parameters.

## Fabrication Export and Tolerance Analysis

- All diffractive lenses designed in VirtualLab Fusion can be exported in fabrication-ready formats.
- Possible fabrication tolerances, e.g., quantization height, can be varied and their influence on the lens performance investigated.



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