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VirtualLab FUSION
FAST PHYSICAL OPTICS SOFTWARE

LightTrans' Industry Workshop at SPIE Photonics West 2020

Diffractive and Metasurfaces: from Function to Structure Simulation Seamlessly in VirtualLab Fusion

SPIE Industry Workshop
Conference: SPIE Photonics West
Date and Time: Wednesday, 5 February 2020 | 13:30 – 14:45
Intended audience: Optical engineers, designers, researchers and students interested in diffractive/metasurfaces and holographic optical elements (HOEs).

Learning Outcomes

- Discover essential physical-optics effects and phenomena in modern optical systems and how to include them in your modeling and design.
- Dive right into the software with hands-on exercises on typical applications (e.g., lens systems, laser optics, fiber coupling, interferometry, microscopy), accompanied by the corresponding workflows.
- Build up your optical system and perform an analysis and design thereof with different modeling technologies and optimization tools in VirtualLab Fusion.

Both diffractive and metasurfaces are drawing growing interest in modern optics applications. They are defined as thin structured layers etched into or deposited onto a surface, usually a flat one. What distinguishes them are the characteristics of the surface building blocks: conventional gratings in the case of diffractive surfaces, metagratings for metasurfaces. By spatially varying the local grating parameters, the surface can be used to produce a smooth change in the incident wavefront phase, amplitude, polarization, or a combination thereof.

The design workflow of diffractive/metasurfaces can be briefly summarized as

- Functional (usually wavefront phase) design for the element (regardless whether diffractive or metasurface)
- Analysis of the influence of the construction parameters of the structure building blocks (including metagratings)
- Arrangement of spatially chirped gratings on the surface

VirtualLab Fusion, unlike most other optical simulation software, enables the complete workflow within a single software platform in a seamless manner. The functional design can be directly generated from VirtualLab Fusion, e.g., the in-built iterative Fourier transform algorithm (IFTA) helps define the initial grating phase transmission. Existing designs in binary 2 surface format from Zemax OpticStudio® can be imported as well. Then, the building block grating parameters can be rigorously analyzed and optimized with the in-built FMM, and be used to compose the whole surface. The designed diffractive or metasurfaces can be finally included in an optical system and one can perform a full physical optics simulation which accounts for all the electromagnetic effects occurring in the system.

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