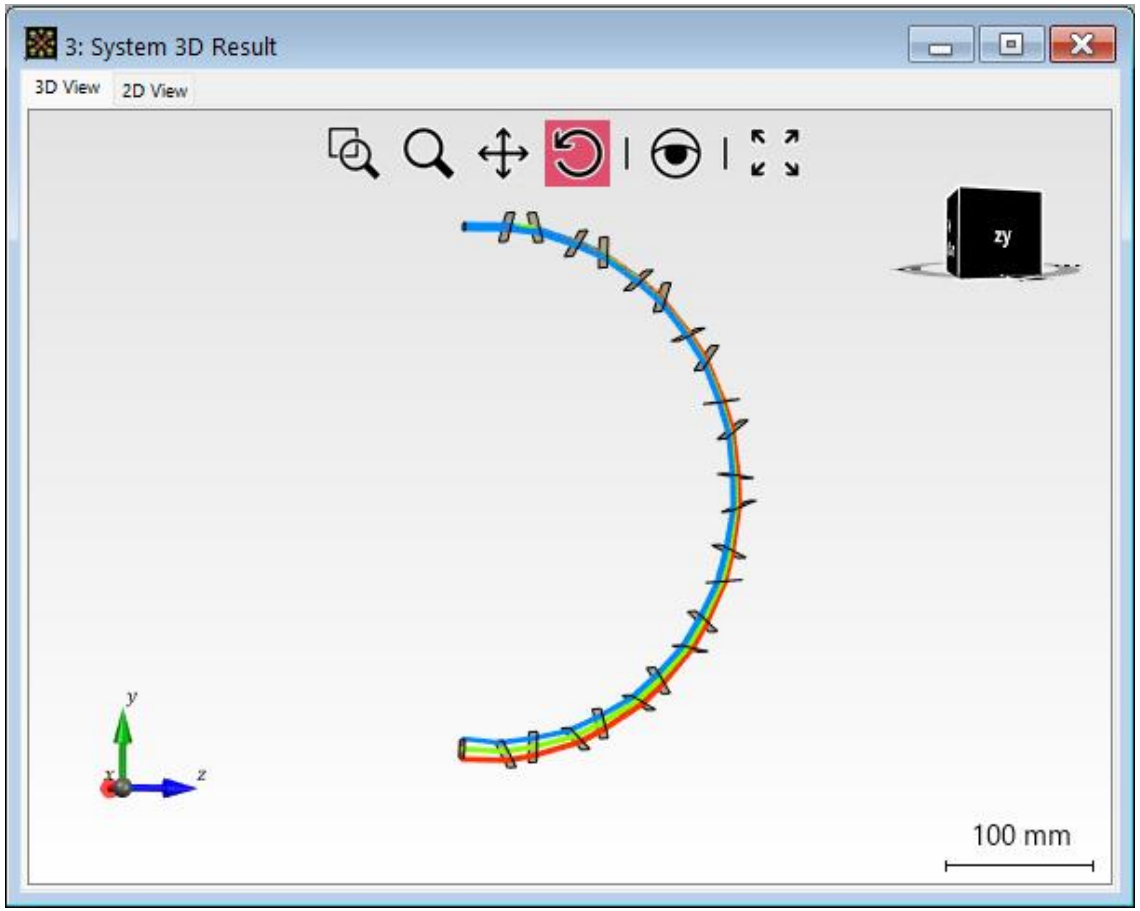
Import Optical Systems from Zemax OpticStudio

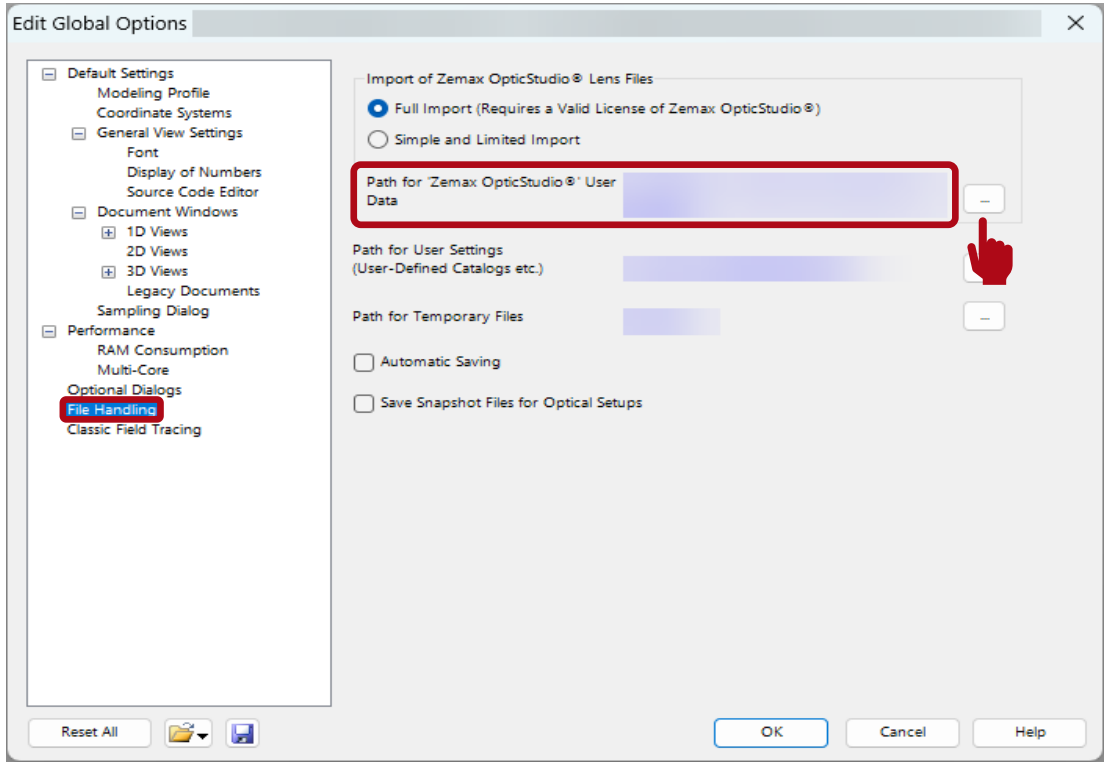
Abstract



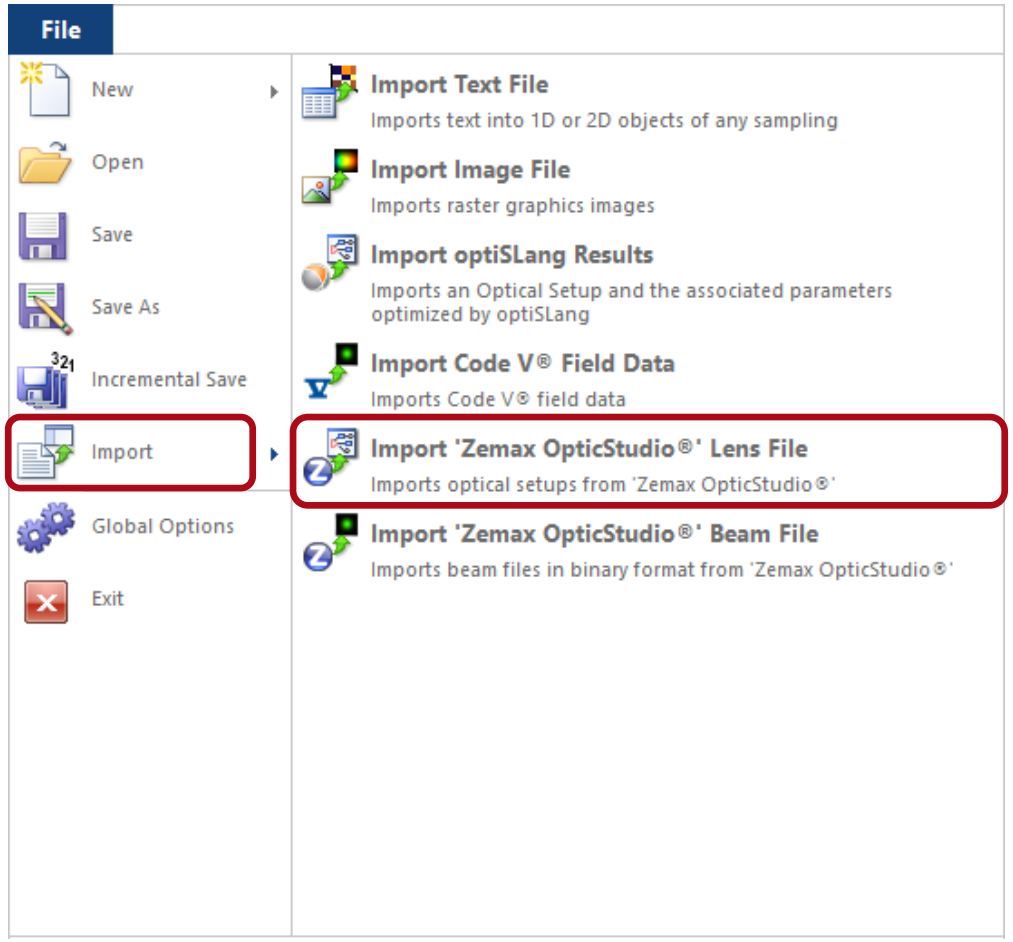
Zemax OpticStudio® is a well-distributed ray tracing software. VirtualLab Fusion allows to import optical systems with full 3D position information, glasses and coating from Zemax OpticStudio®. After the import, the structure data of the optical system will be shown either as single surfaces, or can be combined into components in VirtualLab Fusion. One can perform ray tracing simulation of the imported optical system, and more importantly, field tracing could be performed to further analyze the system.

Pre-processing for Zemax Import

- Zemax OpticStudio® installation is required in the user's PC (minimum version 15.5 SP2).
- A valid license for Zemax OpticStudio® is required (the dongle needs to be plugged in).
- In the Global Options Dialog of VirtualLab Fusion, please set the Path for Zemax OpticStudio® User Data to the address where the "Glasscat" folder from Zemax is located.



Import Zemax OpticStudio® System



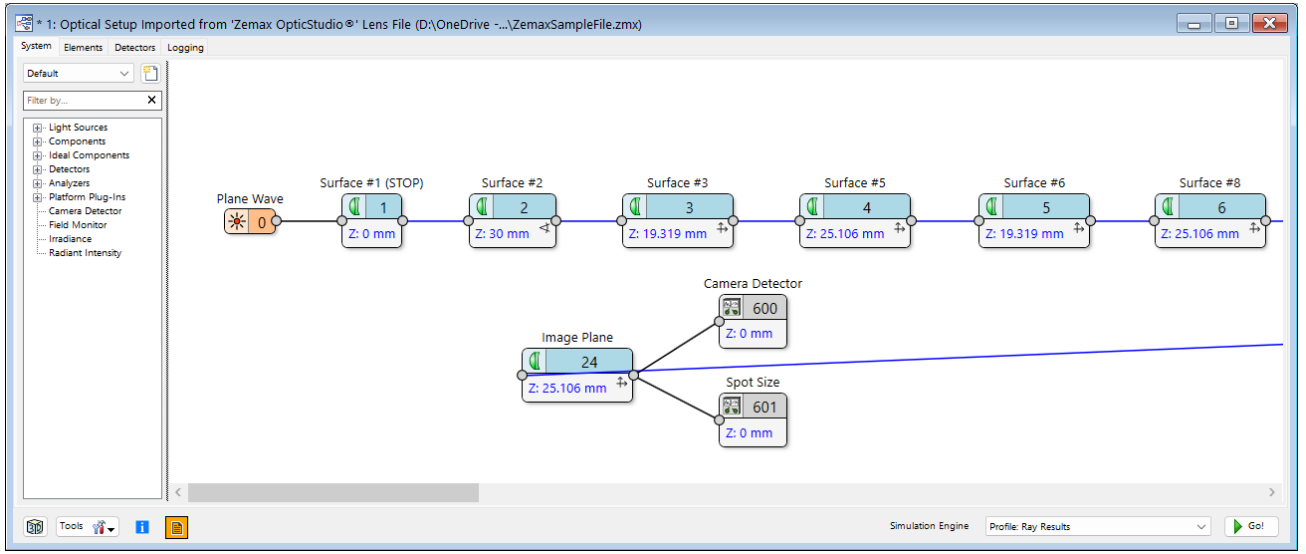
In VirtualLab Fusion, Zemax OpticStudio® files can be imported via the following steps:

- File ➔ Import ➔ Import Zemax OpticStudio® System
- Then open the Zemax system sample file with ".ZMX" extension, which contains the structure data.
- Alternatively, you may drag and drop the Zemax file into VirtualLab and perform the import.

Construct the Optical System

- Every interface in Zemax OpticStudio® data corresponds to a Single Interface Components in VirtualLab Fusion. After the import, the original optical system from Zemax OpticStudio® is shown as multiple Single Interface Components in the optical setup in VirtualLab Fusion.
- A default Plane Wave source is used, with its spectrum initialized according to the wavelengths from Zemax OpticStudio® file, and with its size defined according to the entrance pupil diameter.

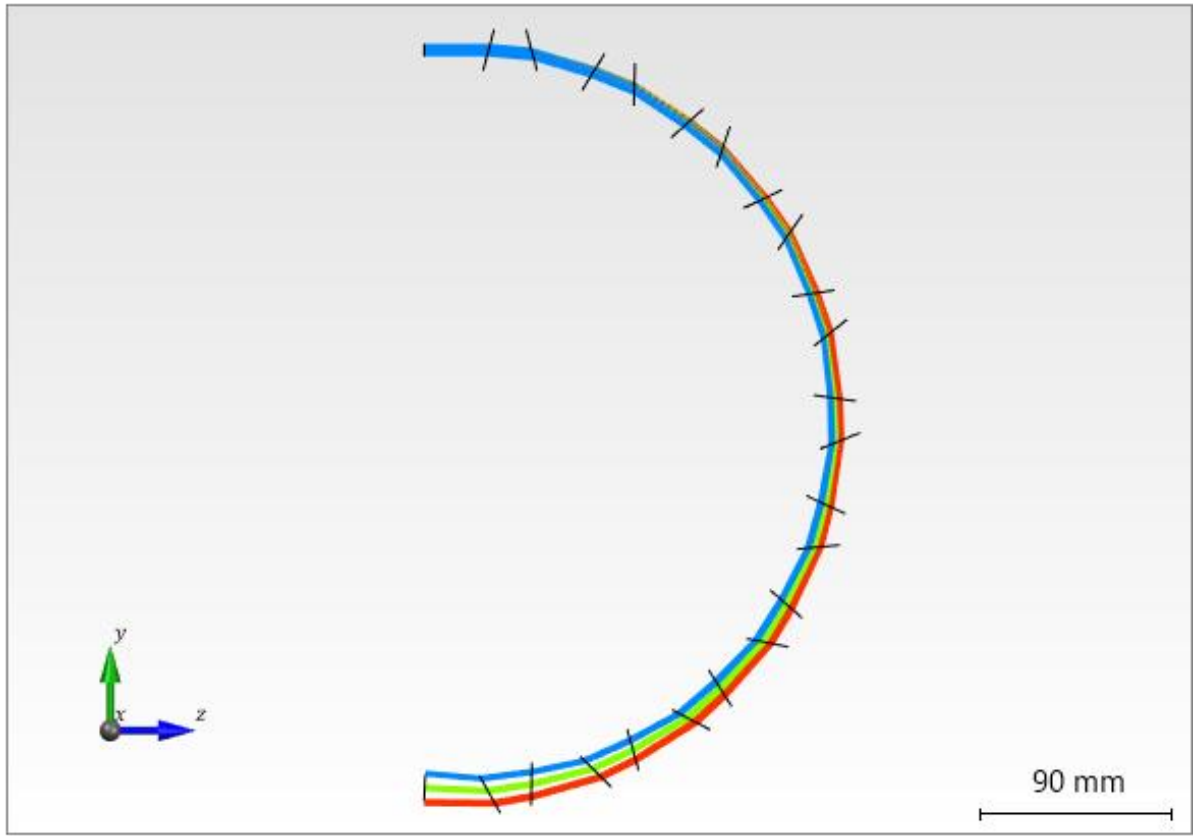
Remark: VirtualLab Fusion also adds a Camera Detector and a Spot Size detector right behind the image plane.

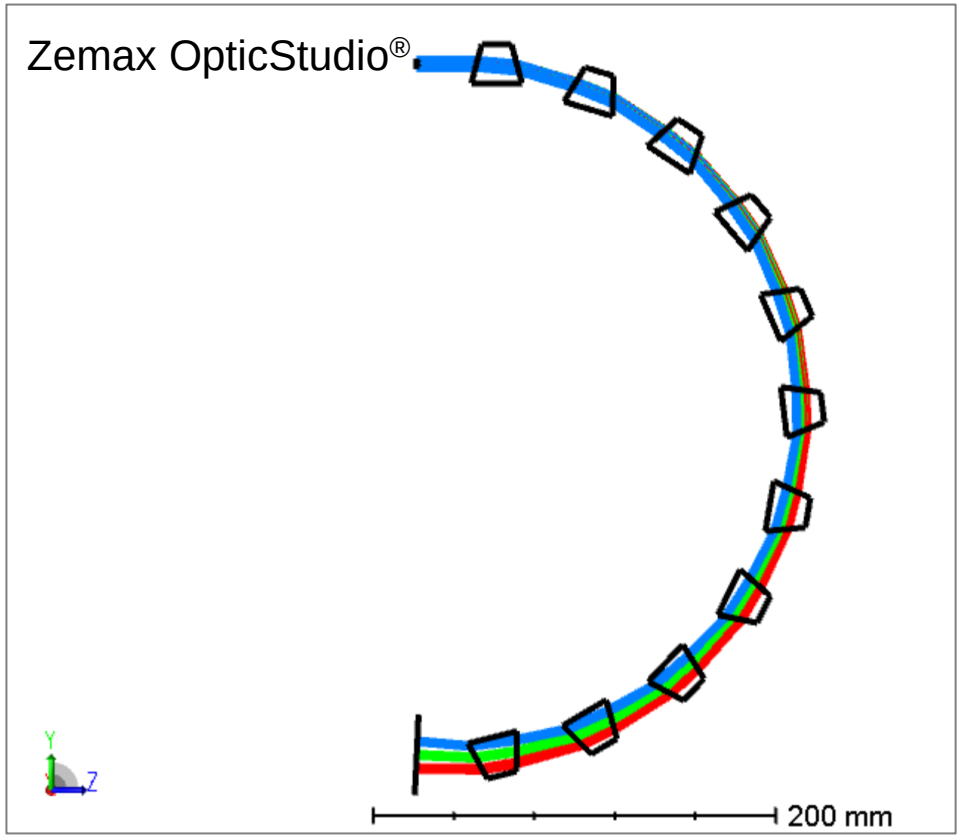


* The Zemax sample file used in this use case is downloaded from Zemax Knowledgebase

Simulation Result – 3D Ray Tracing

- We begin with the ray tracing system analyzer, and the obtained results in VirtualLab and Zemax OpticStudio® are comparable.

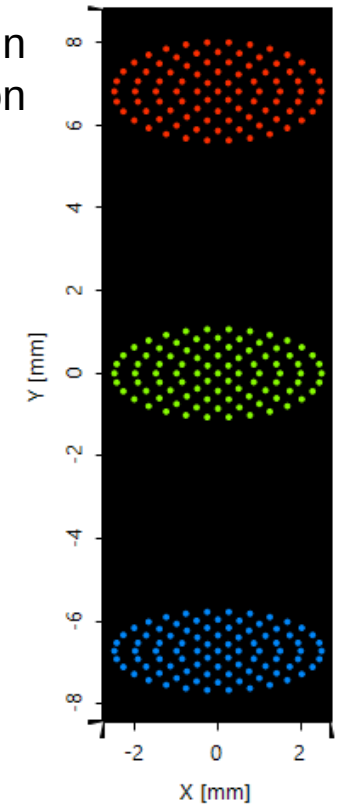




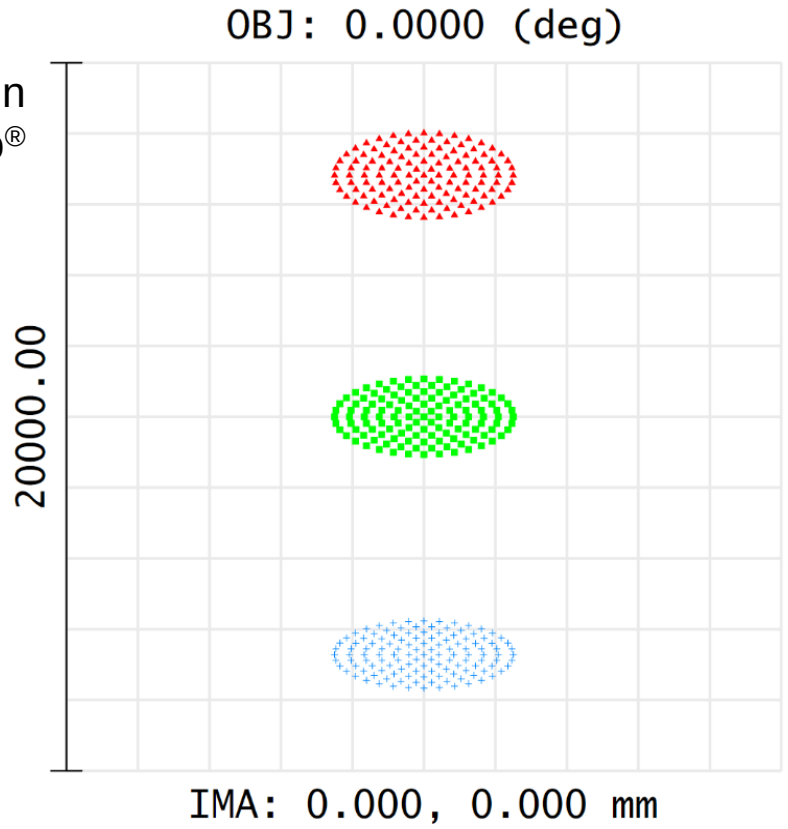
Simulation Result – 2D Ray Tracing

- Then, by running the ray tracing simulation, the result obtained in VirtualLab is also in accordance with the result of Zemax OpticStudio®.

dot diagram in VirtualLab Fusion

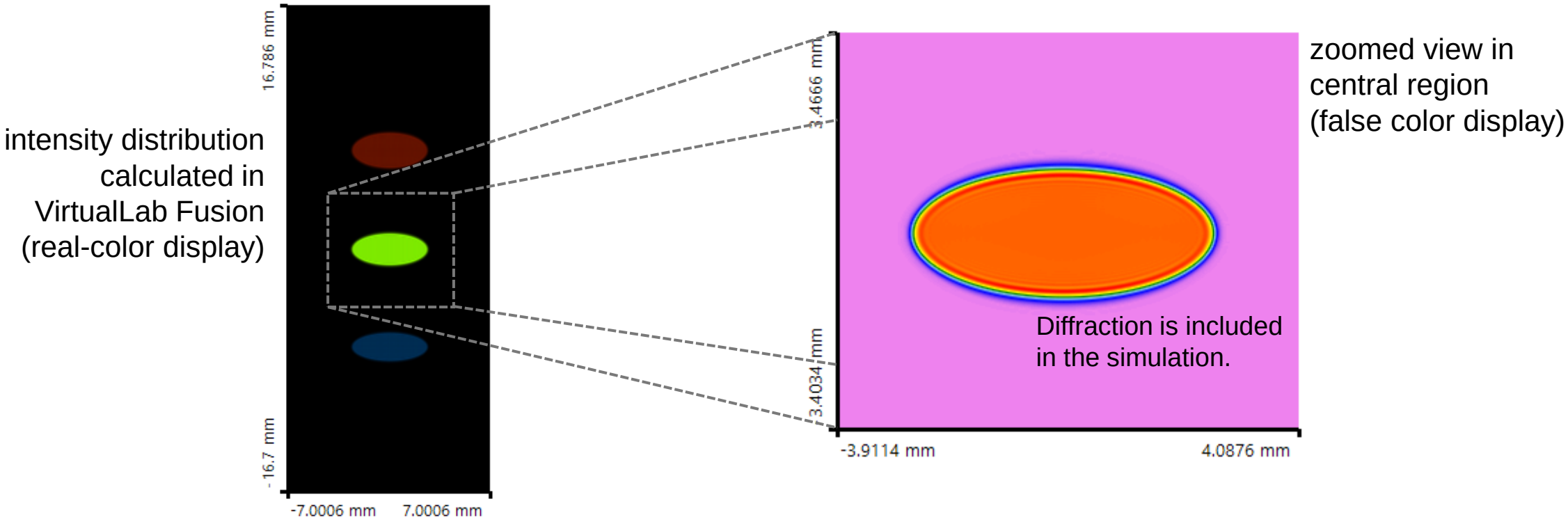


dot diagram in Zemax OpticStudio®



Simulation Result – Field Tracing

- To include also field information and additional propagation effects (like diffraction) you may simply switch to the Field Tracing Engine in VirtualLab Fusion.

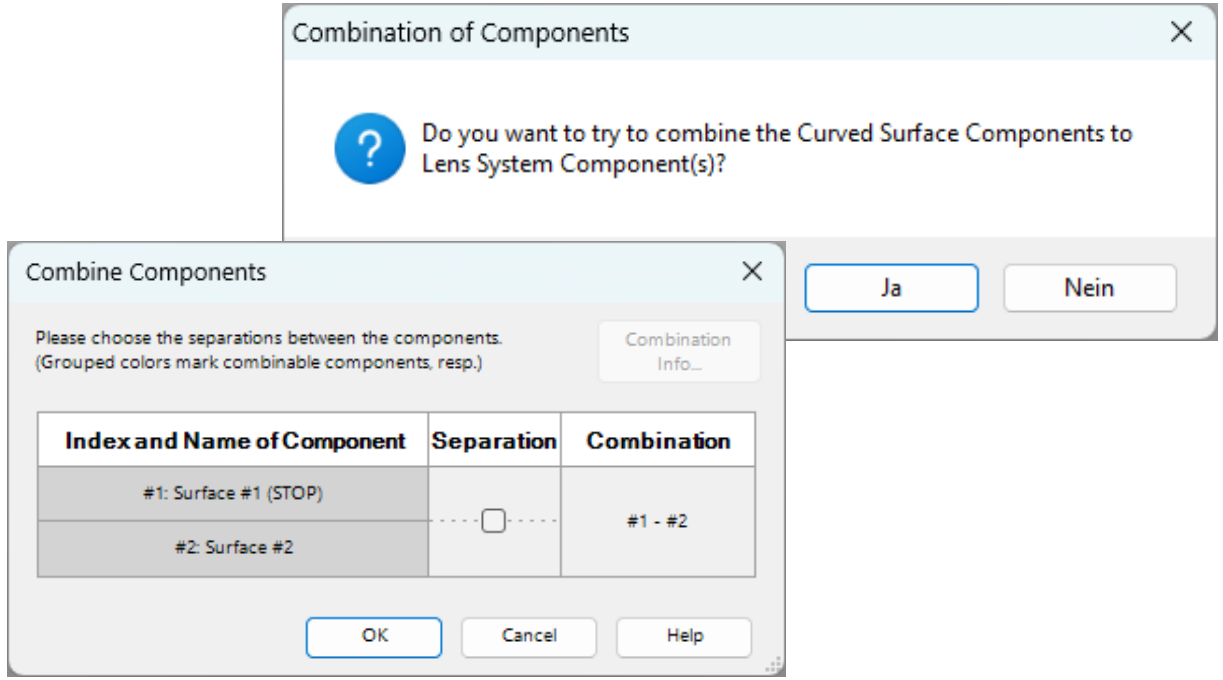


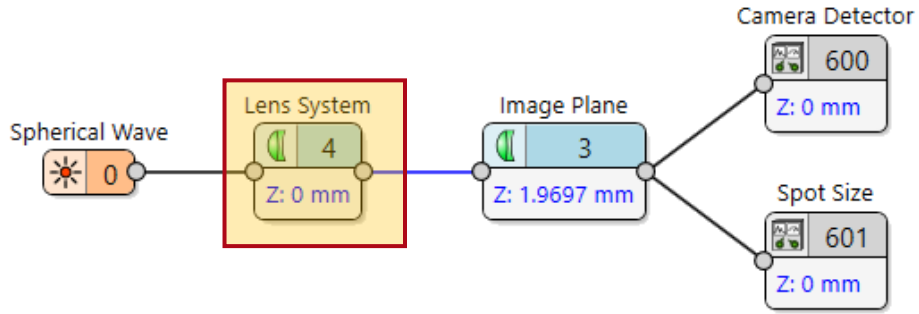
Combination of Components

- If the system being imported contains multiple interfaces that are neither tilt nor rotated, a popup window will appear during the import and ask if the interfaces shall be combined to Lens System Components.

- By default, VirtualLab Fusion suggests combining the interfaces at coordinate breaks into a single Lens System Component, reflecting how they are typically configured in laboratory setups. The user can also customize which interface to combine.

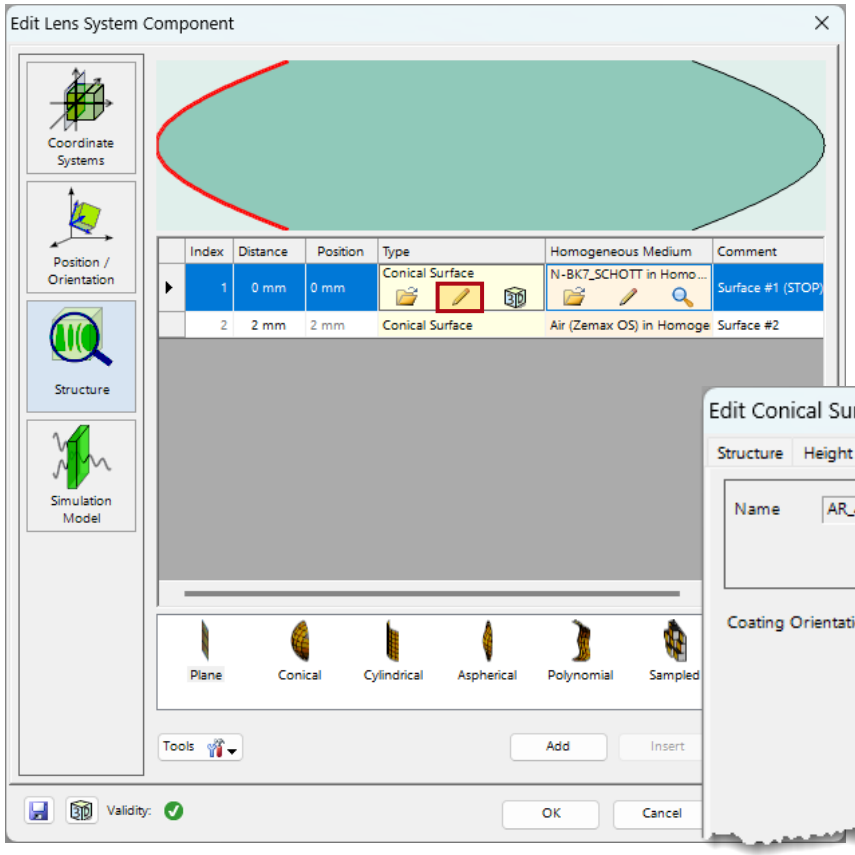
- The coordinate information will be automatically translated during the import, and the imported optical setup in VirtualLab Fusion shall contain the correct positioning information.



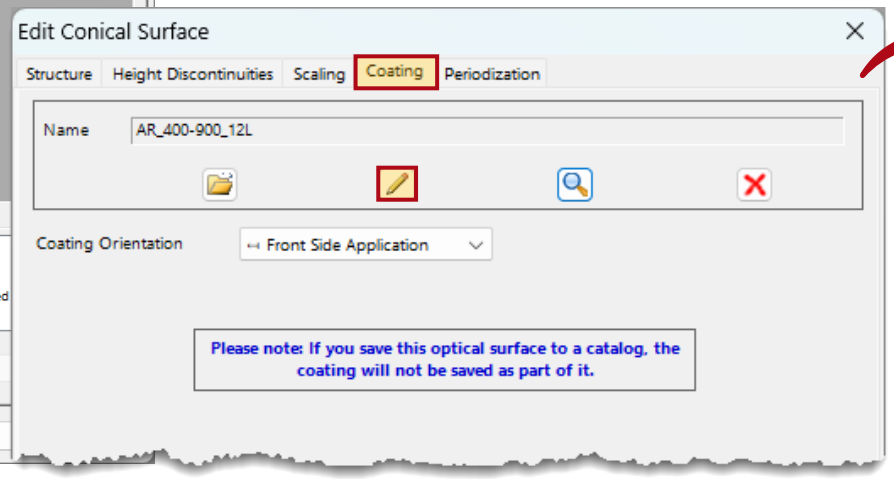


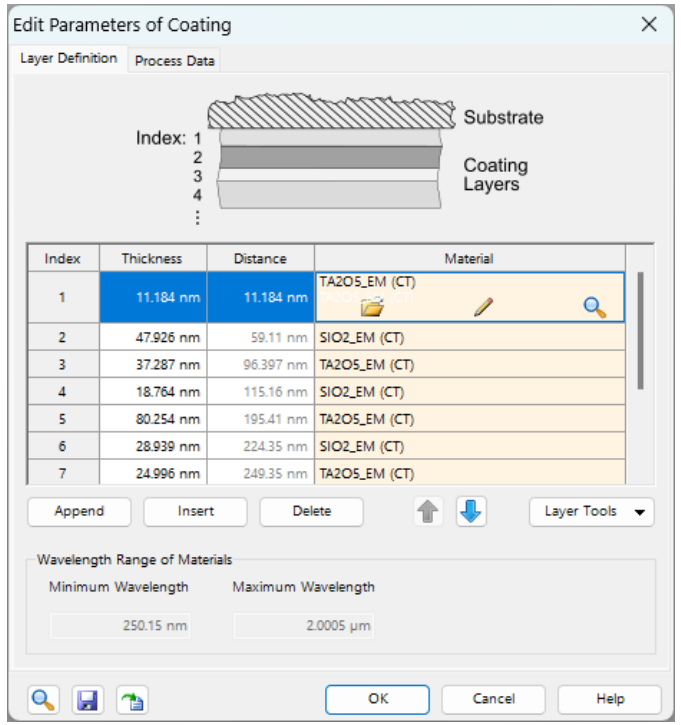
* The Zemax sample file used in this use case is downloaded from Zemax Knowledgebase

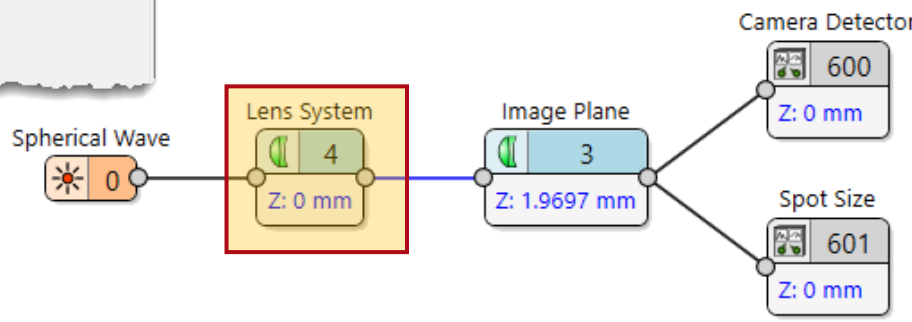
Automatic Import of Coatings



If a surface in the lens system includes a coating, VirtualLab Fusion can automatically import it. Once imported, the coating can be reviewed within the corresponding optical component.

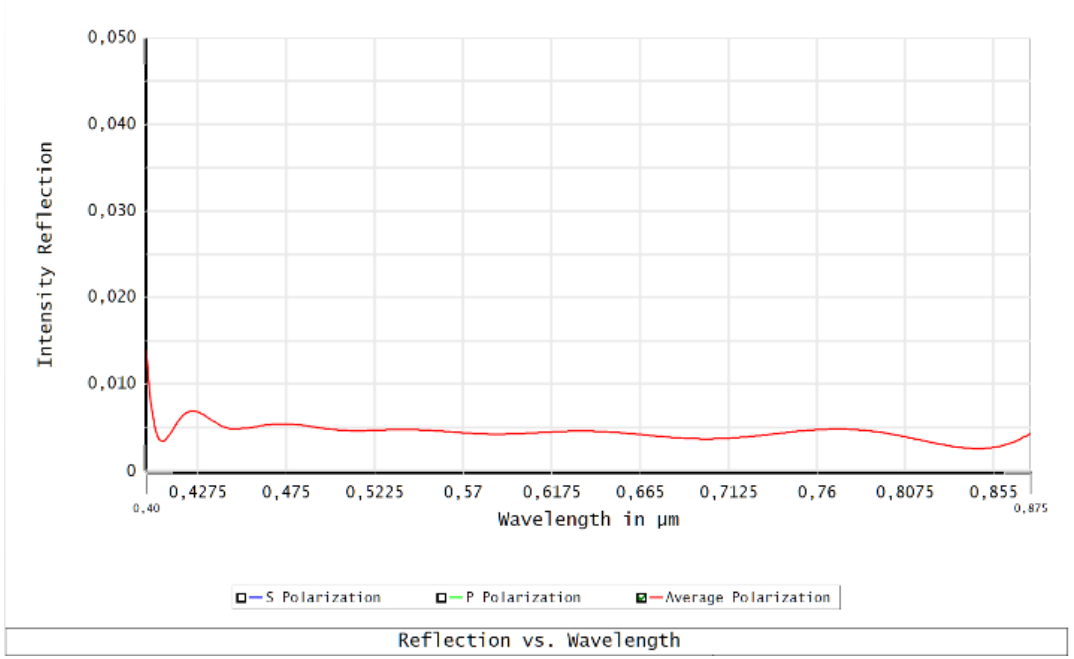




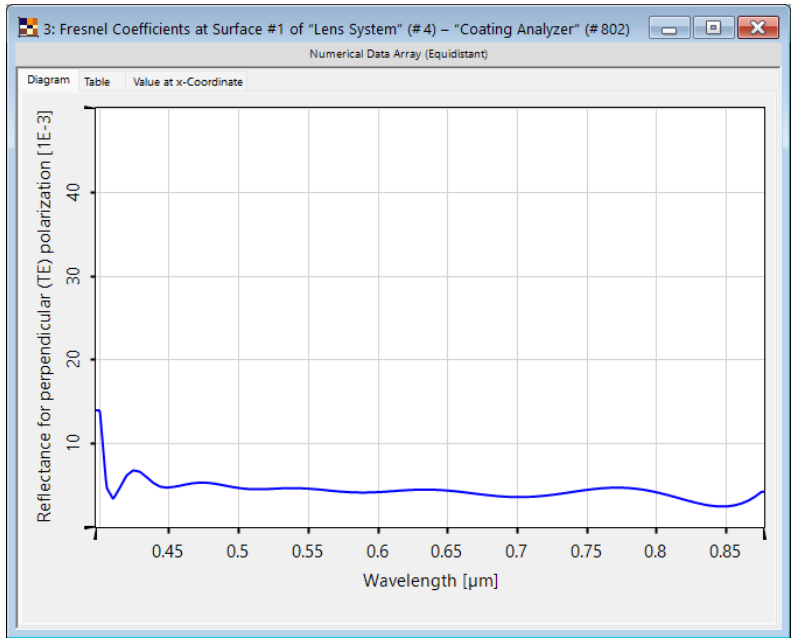


Compare the result of Reflection vs. Wavelength

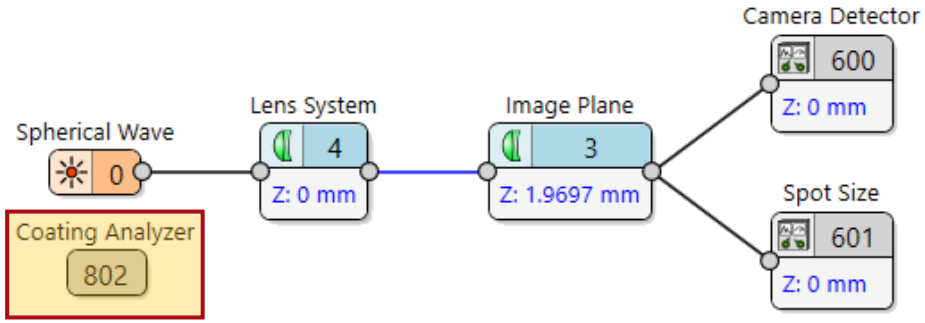
Zemax OpticStudio®



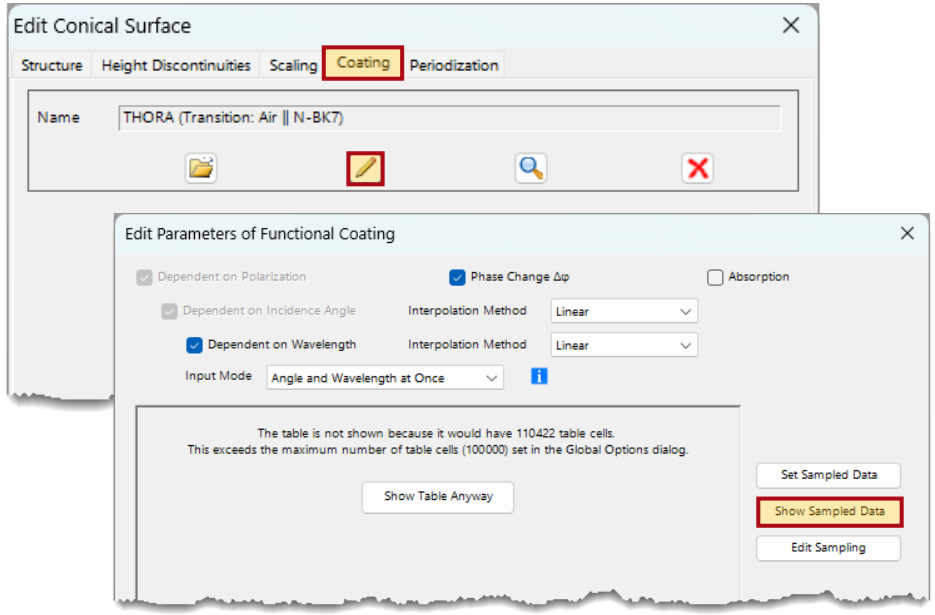
VirtualLab Fusion



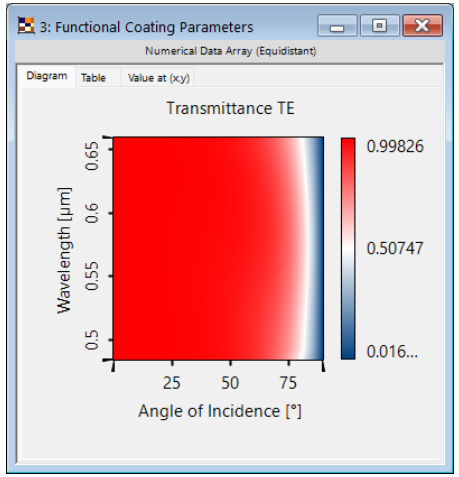
Using *Coating Analyzer*, we can see that the reflection vs. wavelength diagram of the coating can be accurately reproduced within VirtualLab Fusion.

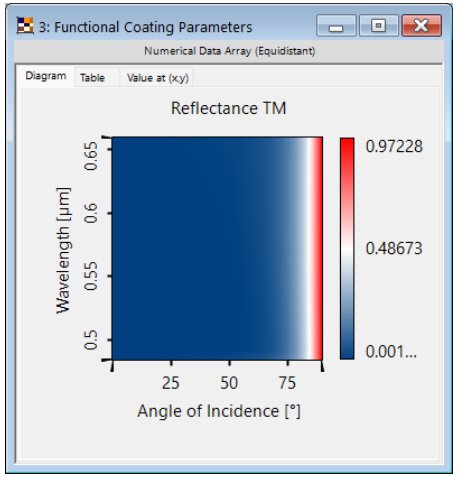


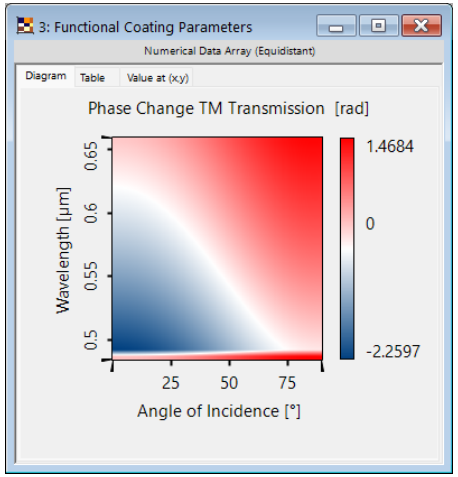
Automatic Import of Encrypted Coatings

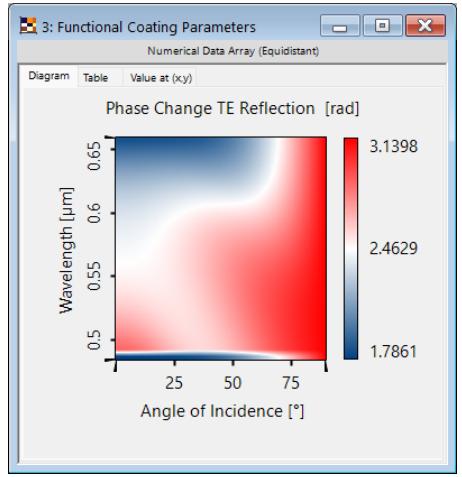


VirtualLab Fusion can also automatically import encrypted coatings by using the wavelength and material transition information provided in the Zemax file. They are defined as functional coating after the import. The user can check the properties of the functional coating also under the *Coating* tab.









Document Information

Title	Import Optical Systems from Zemax OpticStudio®
Document code	TUT.0059
Publication date	08.07.2025
Required packages	-
Software version	2025.1 (Build 1.172)*
Category	Use Case
Further reading	- Import Beam Files from Zemax OpticStudio® - Design and Analysis of Intraocular Diffractive Lens

** The files attached to this document require the specific version or later.*