

Application Scenario 307.01: Parametric optimization of refractive beam shaping element for shaping of circular Top Hat

Abstract

This application scenario demonstrates the setup of a beam shaper system by the refractive beam shaper session editor. The optical performance of the resulting system can be improved by the parametric optimization of VirtualLab.

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Keywords:	parametric optimization, lens system, beam shaping, Top Hat, refractive beam shaping element
Requirements:	VirtualLab Advanced version 5.0.0 or higher – Starter Toolbox
Version:	1.1
Files:	Corresponding files can be found here .
Related Scenarios:	Scenario_100.01 , Scenario_101.01 , Scenario_284.01
Related Tutorials:	Tutorial_101.01
Related Technical Notes:	TN.021

The actual scenario is demonstrated in the file `Scenario_307.01_Refractive_Top_Hat_Beam_Shaper_Task.pdf`.

It shows the usage of the *Refractive Beam Shaping Session Editor* for creating a refractive beam shaping element that converts a Gaussian input beam into a circular Top Hat on the target plane by an analytical geometrical optics approach.

After this, the *Parametric Optimization* is applied to the resulting *Light Path Diagram*. The optimization goal is to further improve the SNR of the Top Hat. In the parametric optimization document, which is available through the file `Scenario_307.01_Refractive_Top_Hat_Beam_Shaper_2.opt`, the merit functions *Conversion Efficiency* and *SNR* are used with appropriate target values to get a target function whose optimal value is a minimum. The aspherical parameters of the beam shaper are varied by the downhill simplex algorithm to find a local minimum of the target function.

The final light path diagram that contains the optimized beam shaper is stored in the file `Scenario_307.01_Refractive_Top_Hat_Beam_Shaper_3.lpd`.

Technical Support

If you have any questions, remarks or problems concerning this application scenario, or in using VirtualLab in general, please do not hesitate to contact us by E-Mail support@lighttrans.com.

Please use the update service to install the current version of VirtualLab. Alternatively you can use the latest **Trial Version** of VirtualLab which is available at our [download site](#). If you have been registered already for an older trial version, just contact us by [E-Mail](#).

To ensure that this application scenario gives the same results as described, set the global settings to the default values. In VirtualLab this can be done in the **Extras > Global Options** dialog with the **Reset All** button.