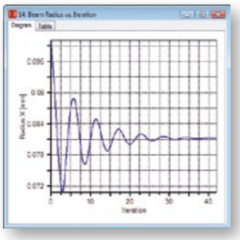
VirtualLab™ 5

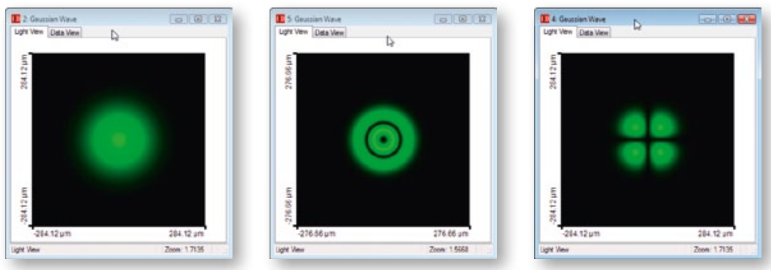
Laser Resonator Toolbox

Flexible eigenmode analysis of laser resonators

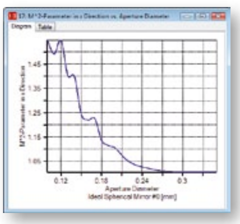


Convergence of the beam radius during Fox-Li iterations.

The VirtualLab™ Laser Resonator Toolbox allows the analysis of eigenmodes of stable laser resonators. The analysis includes the calculation of fundamental modes, higher order modes and eigenvalues. It is based on field tracing which optimally combines various techniques for beam propagation ranging from geometrical optics to electromagnetic approaches. That allows for instance the inclusion of microstructures and DOEs inside the cavity, the simulation of index modulations of the active medium and of arbitrary shapes of fundamental modes. Catalogs for surface profiles and media and customizable components provide a great flexibility for the definition of resonators in VirtualLab™. Tolerance simulations enable the investigation of the stability of a resonator.



Your Benefit



M^2 beam parameter of the fundamental mode for varying size of an aperture.

- Compute eigenmodes, both fundamental and higher modes, and eigenvalues of resonator systems.
- Simulate micro-structured mirrors and diffractive optical elements as part of the resonator. Customized apertures are available.
- Import resonator systems from LASCAD for analysis with VirtualLab™ field tracing.
- Perform tolerance analysis of the resonator by parameter variation.
- Compute outcoupling modes and use them as source in exterior optical systems (Starter Toolbox required).

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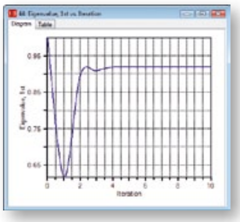
Laser Resonator Toolbox

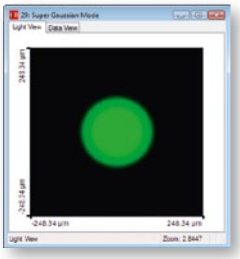
Selected Features



Convergence history of the largest eigenvalue.

Eigenmode analysis including higher modes

VirtualLab™ provides two algorithms for analyzing resonators: the Fox-Li and the Arnoldi algorithm. The buildup of laser oscillation can be shown. Fundamental and higher eigenmodes and eigenvalues can be computed. The convergence of the algorithms is controlled and can be checked by a deviation detector.



Super Gaussian (top hat) eigenmode designed by using a micro-structured mirror.

Micro-structured mirrors and diffractive optical elements

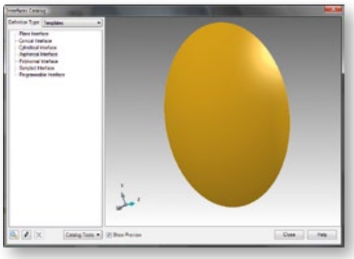
VirtualLab™ supports the simulation of micro-structured elements as part of the resonator. Components as a customized mirror function and diffractive optical elements are available. In practice, those micro-structured elements can be used to design resonators with pre-defined eigenmodes, e. g., top hat modes.

Beam Parameter, M² calculation and parameter run

VirtualLab™ provides a variety of detectors including those for beam parameters and M². These detectors can be positioned in the resonator. Using the parameter run parameters of the resonator components can be varied automatically. This allows a tolerance analysis of the resonator system.

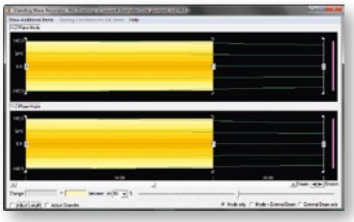
Great variety of optical interfaces and media

VirtualLab™ comes with catalogues for materials, media, optical interfaces and coatings. These can be used to build up resonator systems. Examples are conical, aspherical and polynomial interfaces, homogeneous and GRIN media. Further, interfaces and media are programmable or can be described by imported sampled data.



Import of LASCAD resonator systems

VirtualLab™ supports the import of resonator systems from LASCAD. It is possible to import thermal lenses and the corresponding refractive index data. The analysis of such resonators in VirtualLab™ uses combined simulation techniques including geometrical optics and split-step beam propagation methods.



More information concerning this toolbox including a list of all available features is shown on our website **www. lighttrans.com**

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