

Feature.0008

## How to Use the Simulation Settings

This Use Case describes the meaning and the usage of the simulation settings regarding the global accuracy of the 2nd Generation Field Tracing and the non-sequential tracing.

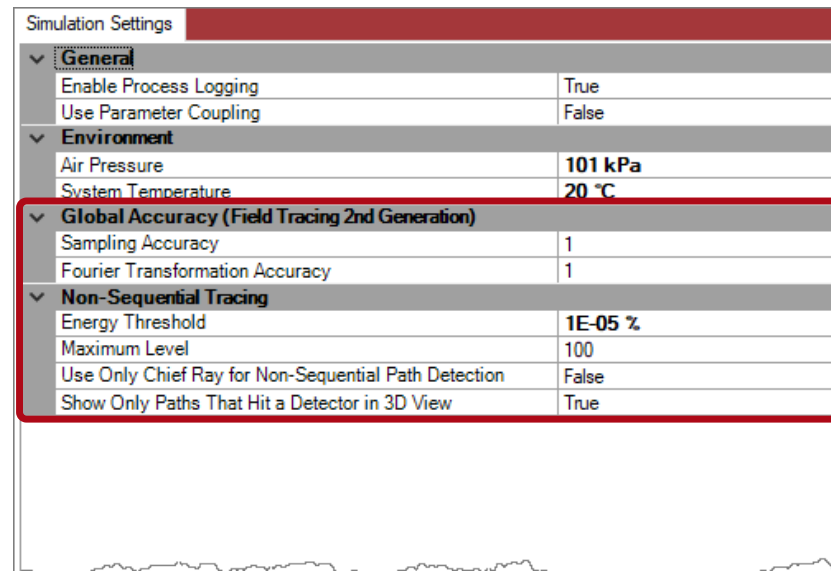
# About This Use Case

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- The following toolbox is required
  - Starter Toolbox
  - Non-Sequential Extension (for non-sequential settings)
- This use case was produced with VirtualLab Fusion (Build 7.0.0.35).

# This Use Case Shows...

- how to specify
  - global accuracy of 2nd Generation Field Tracing
  - settings of non-sequential field and ray tracing



# Overview

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- The following simulation settings will be explained in more detail:

## **Global Accuracy (Field Tracing 2nd Generation)**

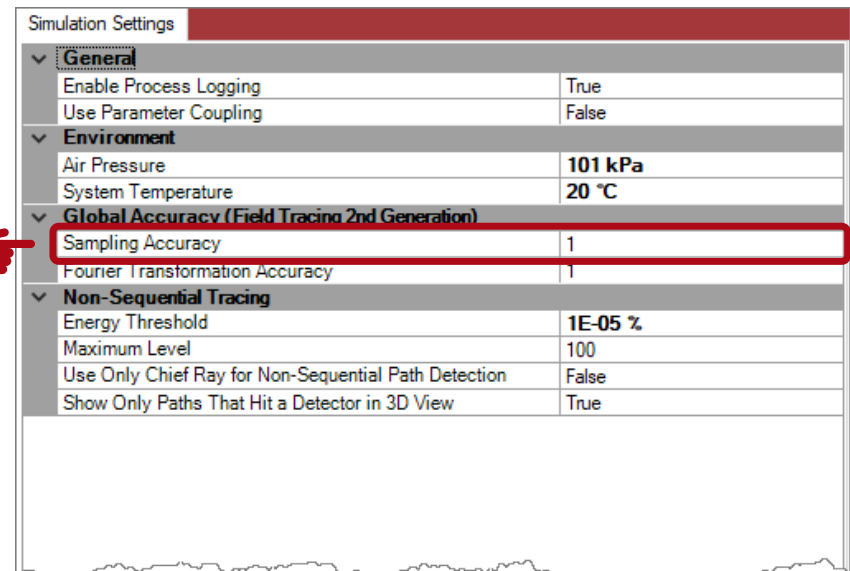
1. Sampling Accuracy
2. Fourier Transform Accuracy

## **Non-Sequential Field/Ray Tracing**

3. Energy Threshold
4. Maximum Level
5. Use Only Chief Ray for Non-Sequential Path Detection
6. Show Only Paths That Hit a Detector in 3D View

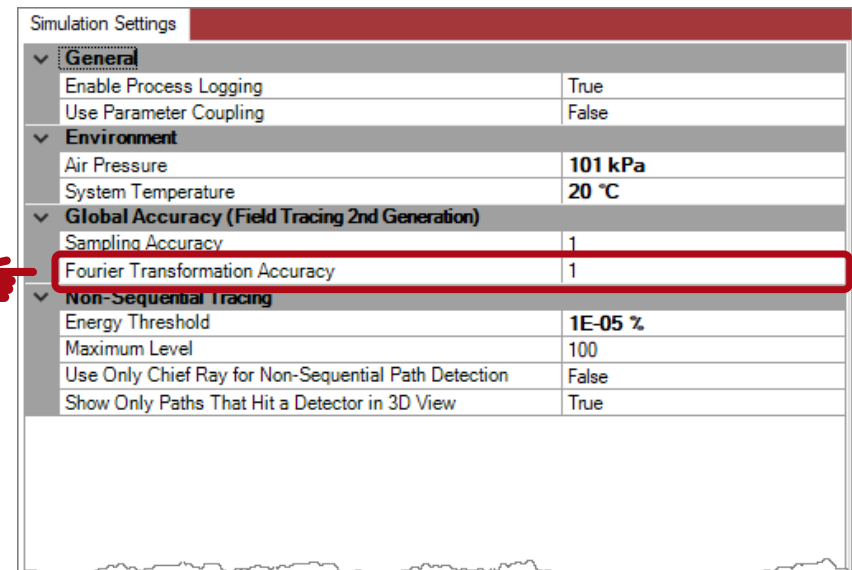
# 1. Sampling Accuracy

- The *Sampling Accuracy* is a parameter to manipulate the accuracy of the field information during its tracing.
- If unexpected artefacts in the intensity occur, this might be overcome by increasing the sampling accuracy factor.



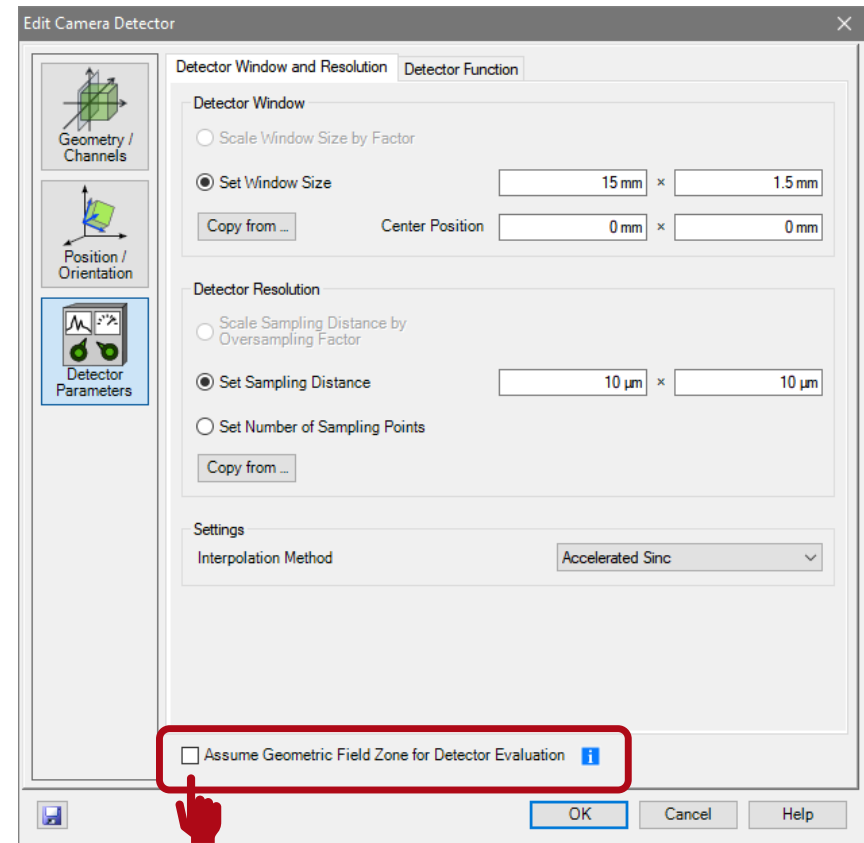
## 2. Fourier Transformation Accuracy

- In VirtualLab there are several Fourier transform algorithms implemented.
- These are selected automatically depending on whether the field is located in its diffractive or geometric zone.
- A small *Fourier Transformation Accuracy* (e.g. 0.01) forces the global use of the geometric Fourier transform, which is typically much faster than the diffractive one.



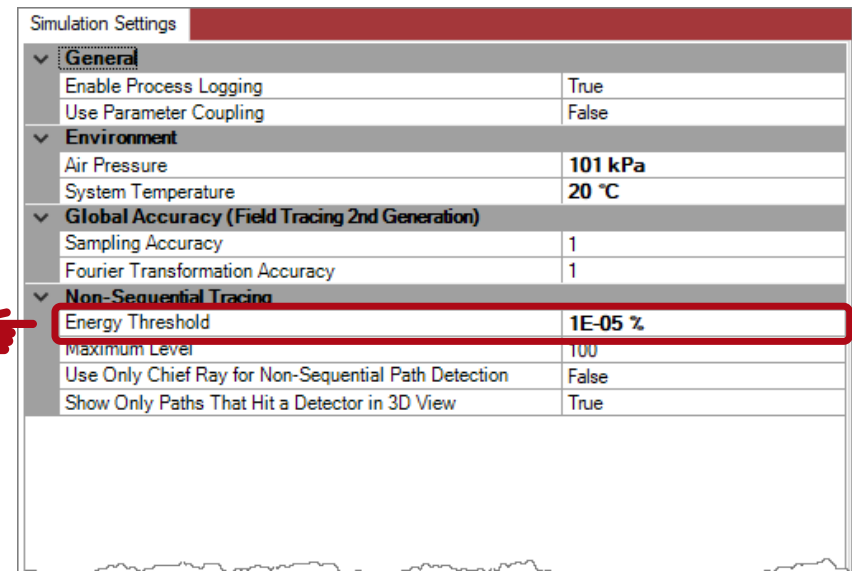
## 2. Fourier Transformation Accuracy

- Additionally, each detector has the option to individually force the use of the geometric Fourier transform.
- This can be selected by activating the check box *Assume Geometric Field Zone for Detector Evaluation* under the *Detector Parameters* tab, in the edit dialog of the corresponding detector.



### 3. Energy Threshold (Non-sequential Ray/Field Tracing)

- The *Energy Threshold* is a stop criterion for the non-sequential tracing engine.
- If the energy of the light for each non-sequential path falls below the energy threshold, the tracing of the light along the path is not processed further.

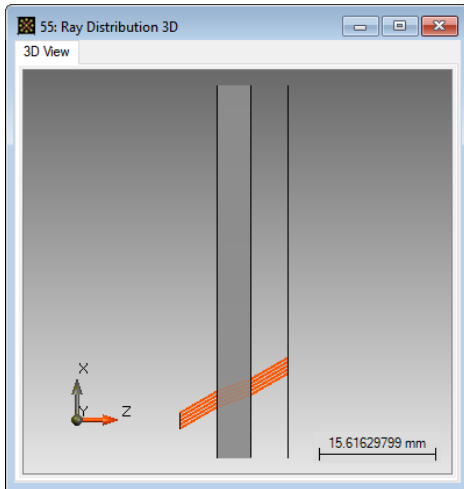




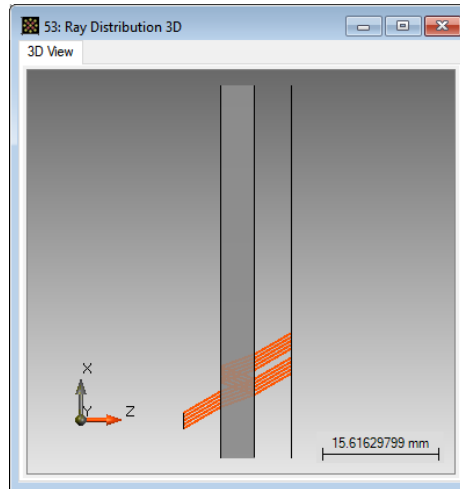
### 3. Energy Threshold (Non-sequential Ray/Field Tracing)

- An example of the impact of the energy threshold is shown below.
- For the purposes of this example, a plane wave with an incidence angle of  $30^\circ$  is propagated through an etalon.
- The smaller the energy threshold, the more paths are traced.

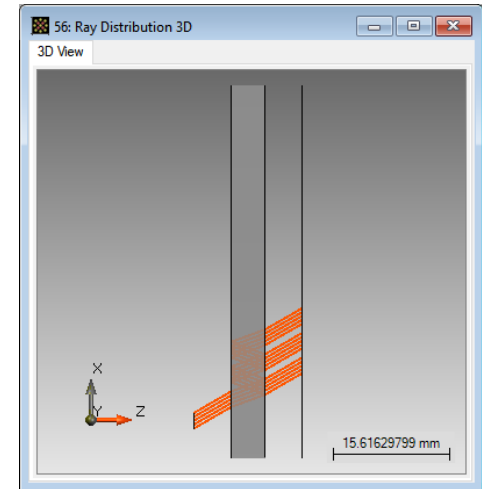
energy threshold  
1 %



energy threshold  
0.01 %

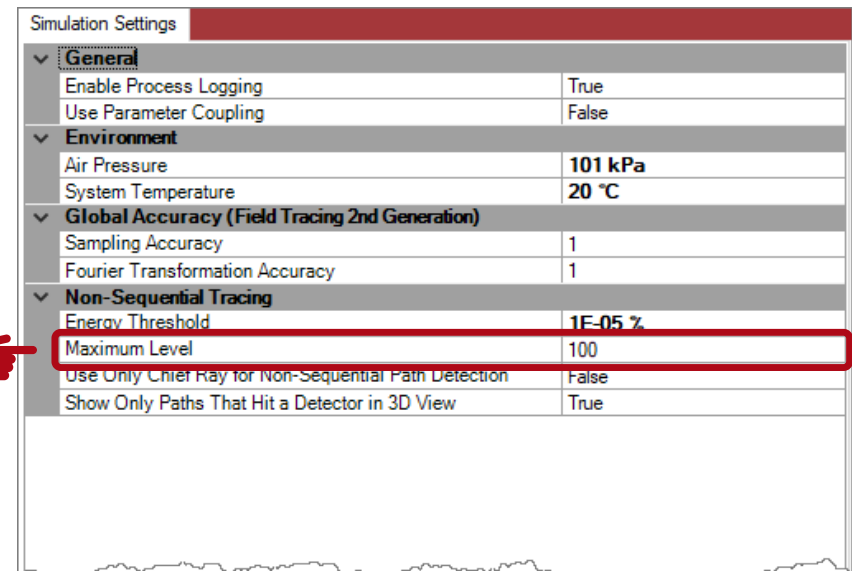


energy threshold  
0.0001 %



## 4. Maximum Level (Non-sequential Ray/Field Tracing)

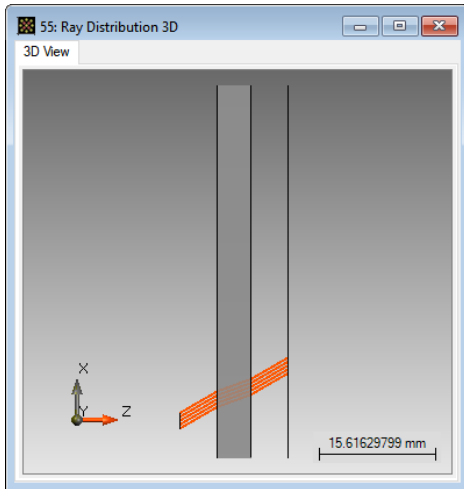
- The *Maximum Level* is a stop criterion for the non-sequential tracing engine.
- This parameters limits directly the non-sequential path detection for each non-sequential path.



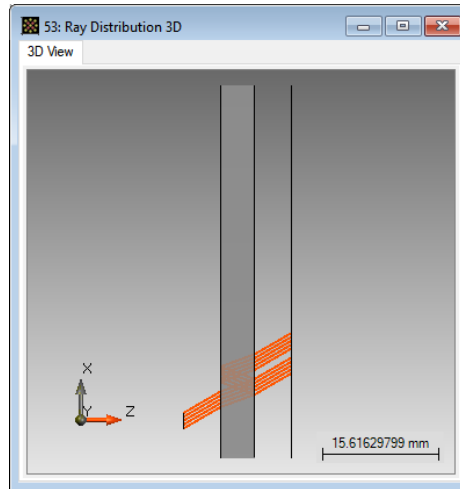
## 4. Maximum Level (Non-sequential Ray/Field Tracing)

- An example of the impact of the maximum level is shown below.
- For the purposes of this example, a plane wave with an incidence angle of  $30^\circ$  is propagated through an etalon.
- The higher the maximum level, the more paths are traced.

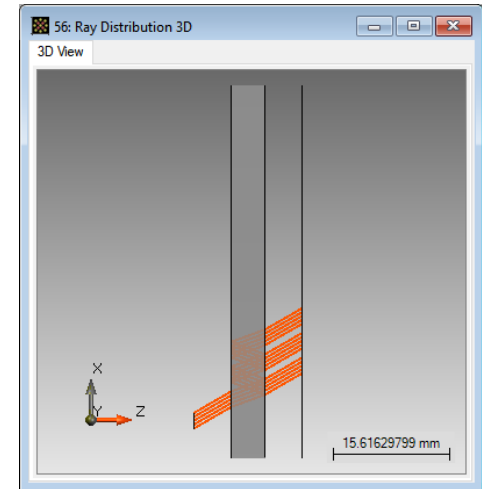
maximum level  
2



maximum level  
4

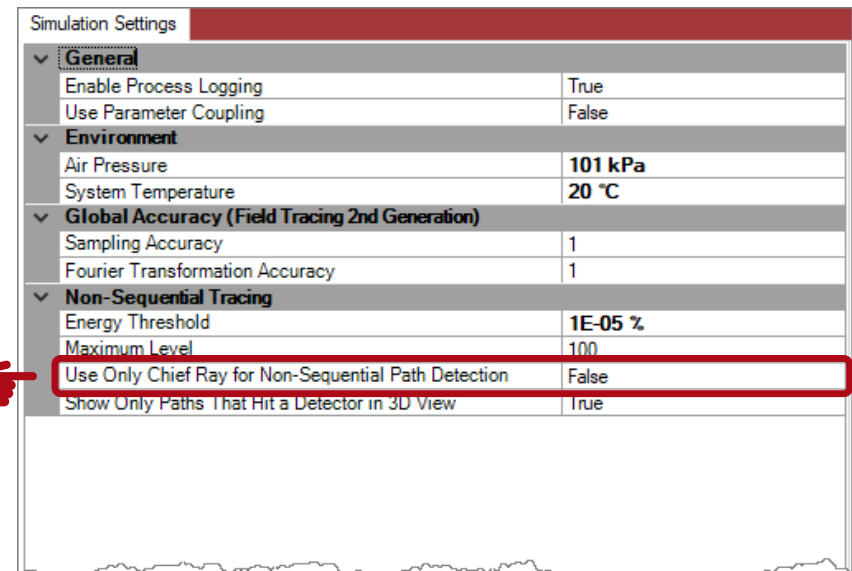


maximum level  
6



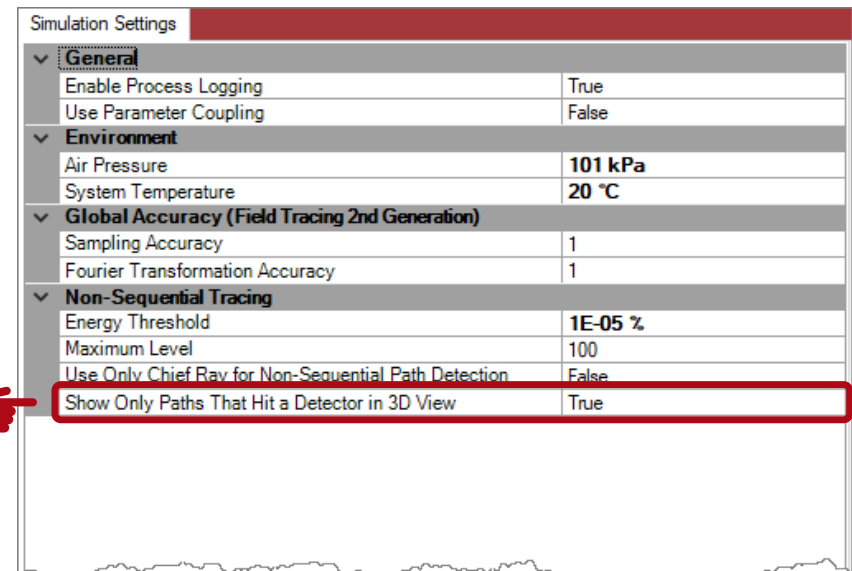
## 5. Path Detection (Non-sequential Ray/Field Tracing)

- For the non-sequential path detection either only the chief ray, or the chief ray and the marginal rays are used.
- This is controlled via the *Use Only Chief Ray for Non-Sequential Path Detection* parameter.



## 6. Path Visualization (Non-sequential Ray/Field Tracing)

- The *Show Only Paths That Hit a Detector in 3D View* parameter controls the visualization of all traced non-sequential paths.
- For stray light visualization it might be interesting to see also the light paths which do not hit the specified detectors.



# Document & Technical Info

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