

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

- 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

	Enable Process Logging	True	
	Use Parameter Coupling	False	
~	Environment		
	Air Pressure	101 kPa	
	System Temperature	20 °C	
~	Global Accuracy (Field Tracing 2nd Generation)		
	Sampling Accuracy	1	
	Fourier Transformation Accuracy	1	
*	Non-Sequential Tracing		
	Energy Threshold	1E-05 %	
	Maximum Level	100	
	Use Only Chief Ray for Non-Sequential Path Detection	False	
	Show Only Paths That Hit a Detector in 3D View	True	



• 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.

Sin	ulation Settings	
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	Sampling Accuracy	1
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	Energy Threshold	1E-05 %
	Maximum Level	100
	Use Only Chief Ray for Non-Sequential Path Detection	False
	Show Only Paths That Hit a Detector in 3D View	True
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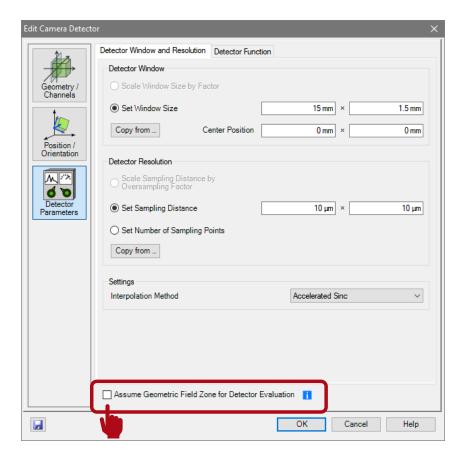
2. Fourier Transformation Accuracy

- 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.

~	General	-
	Enable Process Logging	True
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~	Environment	
	Air Pressure	101 kPa
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 Global Accuracy (Field Tracing 2nd Generation) 		
	Sampling Accuracy	1
•	Fourier Transformation Accuracy	1
~	Non-Sequential Tracing	
	Energy Threshold	1E-05 %
	Maximum Level	100
	Use Only Chief Ray for Non-Sequential Path Detection	False
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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.



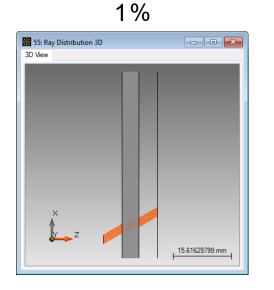
3. Energy Threshold (Non-sequential Ray/Field Tracing)

- 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.

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~	Environment		
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	Sampling Accuracy	1	
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¥ .	Non-Sequential Tracing		
	Energy Threshold	1E-05 %	
	Maximum Level	100	
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	Show Only Paths That Hit a Detector in 3D View	True	

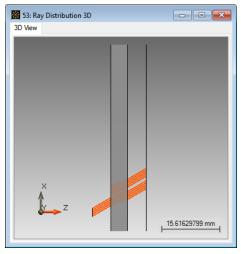
3. Energy Threshold (Non-sequential Ray/Field Tracing)

- 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° is propagated through an etalon.
- The smaller the energy threshold, the more paths are traced.

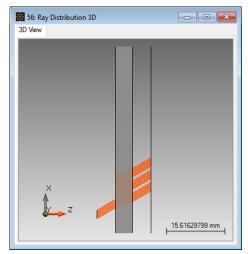


energy threshold

energy threshold 0.01%



energy threshold 0.0001%



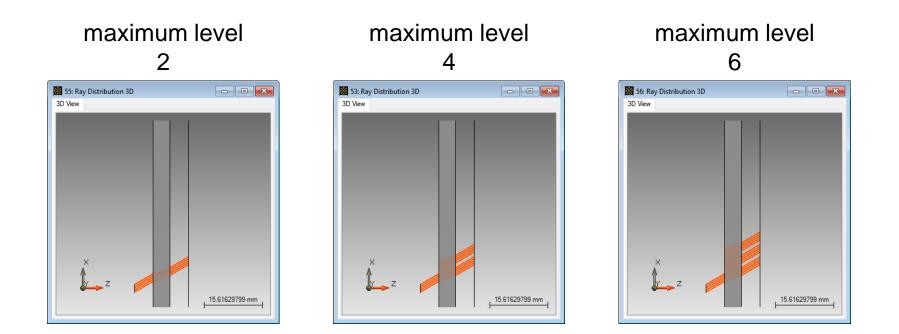
4. Maximum Level (Non-sequential Ray/Field Tracing)

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

Sim	ulation Settings	
	General	
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\sim	Environment	
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	Sampling Accuracy	1
	Fourier Transformation Accuracy	1
	Non-Sequential Tracing	
	Enerav Threshold	1E-05 %
	Maximum Level	100
	Use Only Chief Ray for Non-Sequential Path Detection	False
	Show Only Paths That Hit a Detector in 3D View	True
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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° is propagated through an etalon.
- The higher the maximum level, the more paths are traced.



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.

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	Sampling Accuracy	1
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\sim	Non-Sequential Tracing	
	Energy Threshold	1E-05 %
	Maximum Level	100
	Use Only Chief Ray for Non-Sequential Path Detection	False
	Show Only Paths That Hit a Detector in 3D View	Irue
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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.

Enable Process Logging True Use Parameter Coupling False Image: System Temperature 101 kPa System Temperature 20 °C Global Accuracy (Field Tracing 2nd Generation) Sampling Accuracy Sampling Accuracy 1 Fourier Transformation Accuracy 1 Non-Sequential Tracing Energy Threshold Maximum Level 100 Use Only Chief Bay for Non-Sequential Path Detection False	Use Parameter Coupling False Environment Air Pressure System Temperature 20 °C Global Accuracy (Field Tracing 2nd Generation) False C 		
Environment Air Pressure System Temperature System Temperature 20 °C Global Accuracy (Field Tracing 2nd Generation) Sampling Accuracy Fourier Transformation Accuracy 1 Non-Sequential Tracing Energy Threshold Maximum Level 100	V Environment Air Pressure 101 kPa System Temperature 20 °C V Global Accuracy (Field Tracing 2nd Generation)		
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Non-Sequential Tracing Energy Threshold 1E-05 % Maximum Level 100	compiling Accordacy		
Energy Threshold 1E-05 % Maximum Level 100	Fourier Transformation Accuracy 1		
Maximum Level 100	Non-Sequential Tracing		
100	Energy Threshold 1E-05 %		
Use Only Chief Ray for Non-Sequential Path Detection False	Maximum Level 100		
	Use Only Chief Ray for Non-Sequential Path Detection False		
Show Only Paths That Hit a Detector in 3D View True	Show Only Paths That Hit a Detector in 3D View True		

Document & Technical Info

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