

# Ansys SPEOS - Far Infrared Extension

Extend optical simulation up to the far infrared wavelength range. Model thermal radiation directly from the body temperature field.

Far infrared (FIR) extension helps engineers to design and analyze personal infrared vision devices, as well as detection systems used in the defense industry on land systems, UAVs and satellites. With the Ansys SPEOS Far Infrared Extension, it is easy to simulate and optimize visible, near infrared and far infrared systems (wavelength range extended to  $10\mu\text{m}$ ) for active and passive detection. You can automatically calculate and understand the efficiency of your optical system using dedicated tools for luminance, illuminance and intensity measurements. In addition to data acquired by the camera, you can visualize your field of view with pixel grids projected on the 3D environment to determine detection capabilities and to process simulated camera acquisition with image processing. This enables optical designers and embedded software developers to collaborate on the digital mock-up. You can easily access the performance and robustness of your vision and detection systems in various scenarios, reducing the need for physical testing.

**Thermic Source:** Simulations are performed with a thermic source for which the total radiant flux and the spectrum are defined by the source's temperature (in kelvins) and the optical emissivity of the support geometry.

**Earth Atmosphere Source:** To model the sky, this feature provides the solar illumination in any atmospheric condition (defined from atmospheric profiles of temperature, aerosol pressure). It computes the direct, scattered and thermal contribution from UV up to far infrared ( $100\ \mu\text{m}$ ) wavelengths. It also simulates the atmospheric attenuation on perception of a distant target.

**Night Vision Goggle:** By simulating the behavior of a tube intensifier inside a night vision device, the design engineer can be aware of the operator's perception in any environmental condition to analyze the system's performance.

## / Feature Details

**UV-FIR (100nm- $\mu\text{m}$ ):** This feature extends the optical simulation range up to the far infrared range and also models thermal radiation. Propagation considers optical properties for surfaces characterized by their full anisotropic diffusion (BRDF, BTDF, and BSDF), such as skin, human tissue, materials and source emission (UV, infrared, gamma-ray, X-ray).



Infrared simulation visualization with Ansys SPEOS.

Ansys SPEOS	PrepPost / Solver Bundle Packages			Add-Ons				
	Pro	Premium	Enterprise	Optical Part Design	Optical Sensor Test	HUD Design & Analysis	Far Infrared Extension	Optical Design Optimizer
<b>General Solver Capabilities</b>								
Monte-Carlo Forward Ray Tracing	●	●	●					
Monte-Carlo Backward Ray Tracing		●	●					
Deterministic Simulation	■	●	●					
Spectral Propagation	●	●	●					
Polarization Propagation	●	●	●					
Dispersion	●	●	●					
Surface Diffusion	●	●	●					
Volumic Diffusion	●	●	●					
Ambiant Material	●	●	●					
SPEOS Live Preview (GPU acceleration)		● <sup>2</sup>	● <sup>2</sup>					
Virtual BSDF			● <sub>1</sub>					
<b>Photometry</b>								
Intensity	●	●	●					
Illuminance	●	●	●					
3D Illuminance	●	●	●					
Luminance	■	●	●					
3D Energy Density		●	●					
360° View - Observer		●	●					
360° View - Immersive		●	●					
<b>Human Vision</b>								
Dynamic Adaption			●					
Glare Simulation			●					
High Dynamic Range Screen Support			●					
<b>Wavelength Range</b>								
Visible (360nm - 830nm)	●	●	●					
UV (50nm - 360nm)		●	●					
Near IR (830nm - 2.5µm)		●	●					
Far Infa-Red (2.5µm - 100µm)			●				●	
<b>Optical Design</b>								
Parabolic Surface	●	●	●					
TIR Lens	●	●	●					
Projection Lens	●	●	●					
Optical Lens				●				
Optical Surface				●				
Light Guide				●				
Sharp Cut-Off Reflector				●				
Poly-Ellipsoidal Surface				● <sub>1</sub>				
Micro Optical Stripes				● <sub>1</sub>				
Honeycomb Lens				● <sub>1</sub>				

● Fully Supported

■ Limited Capability

◆ Requires more than 1 product

●<sub>1</sub> Not available for Ansys SPEOS

●<sup>2</sup> Only for Ansys SPEOS

Ansys SPEOS	PrepPost / Solver Bundle Packages			Add-Ons				
	Pro	Premium	Enterprise	Optical Part Design	Optical Sensor Test	HUD Design & Analysis	Far Infrared Extension	Optical Design Optimizer
<b>Optical Sensors</b>								
Field of View					•			
Export Sensor Grid as Geometry					• <sup>1</sup>			
Camera Sensor					•			
LiDAR Sensor					•			
Camera Sensor Post Processing					•			
<b>Head-Up Display</b>								
HUD Optical Analysis						•		
HUD Optical Design						•		
HUD Visualization						•		
<b>HPC - SPEOS</b>								
Default Number of Cores	4	4	4					
Parallel Solving on Local PC	•	•	•					
Parallel Solving on Cluster	•	•	•					
Ansys RSM compability	•	•	•					
<b>Simulation Preparation</b>								
Source Group	• <sup>1</sup>	• <sup>1</sup>	• <sup>1</sup>					
Geometry Group	• <sup>1</sup>	• <sup>1</sup>	• <sup>1</sup>					
Local Meshing	• <sup>1</sup>	• <sup>1</sup>	• <sup>1</sup>					
3D Textures	•	•	•					
Polarization Plate		• <sup>1</sup>	• <sup>1</sup>					
Fluorescent Converter		•	•					
Texture Mapping (bump, multi-layer)		• <sup>1</sup>	• <sup>1</sup>					
Sky		•	•					
Thermic Source							•	
Earth Atmosphere model							◆	
<b>Post Processing</b>								
Virtual Lighting Controller		•	•					
Photometric Numerical Certification	•	•	•					
Colorimetric Analysis	•	•	•					
Spectral Analysis		•	•					
Light Expert	•	•	•					
Layer by Source		•	•					
Layer by Face		•	•					
Layer by Sequence		•	•					
Stray Light Analysis		•	•					
Layer by Polarization		•	•					
Visibility & Legibility			•					
Night Vision Goggle							•	
Script Automation	•	•	•					
<b>Optimization</b>								
Parameters	•	•	•					
Design of Experiment	•	•	•					
Design Optimization (1)								
Ansys DesignXplorer (2)	•	•	•					•
Ansys optiSLang interface (2)	◆	◆	◆					

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