Analysis of microlens vertical-cavity surface-emitting laser
Structure

The project is broken into two coupled analyses:

- VCSEL analysis
- Lens Analysis
Analysis

The project is broken into two coupled analyses:

- VCSEL Analysis
- Lens Analysis

Generate Mesh (for the overall analysis)

VCSEL Analysis: Analyze VCSEL using the Crosslight’s PICS3D full vectorial microcavity model

Lens Analysis: Use the Crosslight’s PICS3D full vectorial propagation model to analyze the lens section

Post processing and display final results
Generate Mesh

**PICS3D Analysis**

- Generate the mesh
  - The mesh is generated for the overall structure
  - VCSEL Mesh
  - Lens Mesh
Generate Mesh

PICS3D Analysis

- Generate the mesh
  - The mesh is generated for the overall structure
  - VCSEL Mesh
    - A dense mesh is used for the VCSEL section

![Diagram of mesh generation and structure analysis](image-url)
Generate Mesh

PICS3D Analysis

- Generate the mesh
  - The mesh is generated for the overall structure
  - VCSEL Mesh
    - A dense mesh is used for the VCSEL section
    - Zoom of MQW mesh
Generate Mesh

PICS3D Analysis
- Generate the mesh
  - The mesh is generated for the overall structure
  - VCSEL Mesh
  - Lens Mesh
    - A coarse mesh is used in the Lens section
VCSEL Analysis

**PICS3D Analysis**

- Generate the mesh
- VCSEL analysis
  - The VCSEL is analyzed using the full vectorial microcavity model.
VCSEL Analysis

**PICS3D Analysis**
- Generate the mesh
- VCSEL analysis
  - The VCSEL is analyzed using the full vectorial microcavity model.
  - VCSEL Structure
    - Refractive Index profile
VCSEL Analysis

PICS3D Analysis

- Generate the mesh
- VCSEL analysis
  - The VCSEL is analyzed using the full vectorial microcavity model.
  - VCSEL Structure
  - Cavity Mode
    - Wave Intensity
Lens (propagation) Analysis

- PICS3D Analysis
  - Generate the mesh
  - VCSEL analysis
  - Lens analysis
    - Structure
    - Refractive Index Profile
Lens (propagation) Analysis

PICS3D Analysis
- Generate the mesh
- VCSEL analysis
- Lens analysis
  - Structure
  - Analysis
    - Wave Intensity
Post processing and Results

**PICS3D Analysis**

- **Lens Effect**
  - The effect of the lens is shown in the far field results
  - VCSEL cavity alone
Post processing and Results

**PICS3D Analysis**

- **Lens Effect**
  - The effect of the lens is shown in the far field results
  - VCSEL cavity with microlens