Optical Simulations

Light Emitting and Absorbing Devices
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Light Models

- Optical simulation methods ranked from fast and less physical, to slower and fully physical.

- Ray tracing – Fast, but no physical interference
- Transfer matrix method – Interference effects only calculated in the ray propagation direction
- Beam propagation method – 3D interference, but only valid for narrow propagation angles, such as waveguides
- Finite Difference Time Domain – Full 3D Physics
Light Adsorption – Solar Cells

• Many material and design types used in solar cells
  • Solar spectra
  • Triple cells
  • Anti-reflective
  • Surface roughness
  • Lens
  • Material database
Light Adsorption – Image Sensors

- Efficient large structure 3D builder
- Areal maximum potential surface response
- Transient simulations
• DC, transient and light transmittance LC director response
Light Emission – Light Emitting Diodes

- Many different material systems and designs
- Far and near field intensity
- Quantum effects
- Self heating
Light Emission -VCSEL

- Mode solver
- Self heating
- DC & transient
- Spectra
Waveguides

- Mode solvers
- Suitable for the beam propagation method
Summary

• Integrated solution – no hopping between tools
• Self consistent solutions – Electrical, Optical, Thermal
• Active and passive optical devices possible
• Many different light propagation methods
• Large material database
• Efficient 3D structure creation methods
• Design of Experiments environment