# FDTD

### **3D/2D Maxwell's Solver for Nanophotonic Devices**

FDTD is the gold-standard for modeling nanophotonic devices, processes, and materials. This finely-tuned implementation of the FDTD method delivers reliable, powerful, and scalable solver performance over a broad spectrum of applications. The integrated design environment provides scripting capability, advanced post-processing, and optimization routines - allowing you to focus on your design and leave the rest to us.

FDTD is a simulator within Lumerical's **DEVICE Multiphysics Simulation Suite**, the world's first multiphysics suite purpose-built for photonics designers. The DEVICE Suite enables designers to accurately model components where the complex interaction of optical, electronic, and thermal phenomena is critical to performance.

#### Watch the FDTD overview video

#### **Key FDTD applications include:**

- CMOS Image sensors
- OLEDs and Liquid Crystals
- Surface Metrology
- Surface Plasmonics
- Graphene

- Solar Cells
- Integrated Photonic Components
- Metamaterials
- Diffractive Optics and Photonic Crystals



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### **3D CAD Environment**

3D CAD Environment and parameterizable simulation objects allow for rapid model iterations.

- Build 1D, 2D, or 3D models
- Define custom surfaces and volumes
- Import geometry from standard CAD and IC layout formats



# **Multi-coefficient Models**

Uses multi-coefficient models for accurate material modeling over large wavelength ranges.

- Accurately represent real materials over broad wavelength ranges
- Automatically generate models from sample data, or define the functions yourself.
- Advanced conformal mesh is compatible with dispersive and high-index contrast materials, with high accuracy for coarse mesh



# Nonlinearity and Anisotropy

Simulate devices fabricated with nonlinear materials or materials with spatially varying anisotropy.

- Choose from a wide range of nonlinear, negative index, and gain models
- Define new material models with flexible material plug-ins



# **Powerful Post-Processing**

Powerful post-processing capability, including far-field projection, band structure analysis, bidirectional scattering distribution function (BSDF) generation, Q-factor analysis, and charge generation rate.





### **FDTD Accelerator**

Lumerical's high-performing FDTD works seamlessly with highperformance computing (HPC):

- Greatly speed up single very-large simulations or parameter-sweeps with many small simulations
- Works seamlessly with on-premise platforms or cloud platforms such as Amazon AWS, Microsoft Azure, Google Cloud, and Alibaba Cloud
- Using FDTD's built-in scheduler, launch many parallel servers with little effort
- Job check-pointing to reduce computing costs by enabling users to recover from hardware failures or access to inexpensive spot pricing from cloud providers
- Support for Amazon Linux and self-activated licensing.

#### Read about HPC FDTD on AWS (Amazon Web Services)

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### **FDTD Burst Pack**

Burst Packs offer a convenient way to purchase additional FDTD Accelerators:

- Each Burst Pack contains 1 full FDTD license and 10 FDTD Accelerator licenses to enable users to process a large number of jobs on a Cloud/HPC system in a short amount of time
- Flexible cost-efficient pricing model for 10-day and 30-day "bursts"
- Quickly and seamlessly transition FDTD simulations to the cloud to take advantage of massive computing resources from popular cloud computing providers.



## **Automation**

FDTD is interoperable with all Lumerical tools through the Lumerical scripting language, Automation API, and Python and MATLAB APIs.

- Build, run, and control simulations across multiple tools.
- Use a single file to run optical, thermal, and electrical simulations before post-processing the data in MATLAB.





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Online community

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### Lumerical University (EDU) 🕑

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#### Knowledge Base (KB)

Reference manuals

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# Need help with your Lumerical products?

Our product experts and support specialists make us the preferred full service R&D solution partner in the industry.

Visit our Support page



# **Explore Lumerical's suite of photonic tools**



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