OptiFDTD

OptiFDTD 13.0.3

Finite-Difference Time-Domain Simulation Design

for Microsoft Windows® 7/8/10 64-bit

Optiwave

OptiFDTD 13.0.3 Release Notes

16 Mar 2017

Minor Enhancements and Bug Fixes

OP-211: Add copy/paste functions to the material coefficient definition control.

Improvement. Implemented copy/paste functionality to fill the grid of material definition coefficients (eg. Drude-Lorentz) in the Profile Designer.

OP-262: Launching field exported from observation area propagates in wrong direction.

Fixed. Launching as custom field a field obtained from Observation Area in prior simulations, results in field propagation in a different direction than the propagation direction expected from the field reaching the Observation Area.

OP-288: A channel profile with slanted wall and offset layers has incorrect shape displayed in 3D editor.

Fixed. In some cases of waveguides using Channel Profile with slanted walls and offset layers, the waveguide is not properly rendered in the 3D Editor - parts of the waveguide walls are missing.

OP-293: Set the initial position of the temporary observer plane to the middle of the cut axis.

Improvement. When defining a temporary observer for the runtime field view in Simulator, the initial observer plane position used to be set to the start position of the cut axis. It has been modified to set to the position at the middle of the cut axis. For example, a YZ observer plane will be set at X=0, an XZ observer plane will be set at Y=0.

OP-294: 'Simulate Using Script' has to be checked in order to run the script loaded from a file for 3D simulator.

Fixed. For the 3D simulator, the "Simulate Using Script" has to be selected in order to run a script that is loaded from a file specified by using the '/SCRIPT' in the command line. If the '/SCRIPT' option is provided in the command line, the simulator should run the script even the "Simulator Using Script" was not selected (in the Designer).

OP-295: The modified flag is not set when the change is done only to the nonuniform mesh parameters.

Fixed. Editing the non-uniform mesh parameters doesn't change the project status to "modified" and doesn't prompt the user to save data before the simulations. When the user changes the non-uniform mesh parameters and proceeds to run simulations, he would run simulations on the old data set.

OP-296: Double click on columns causing wrong data displayed when editing dispersive materials.

Fixed. Add a new dispersive material in the Profile Designer. By default the data grid for **isotropic** "Lorentz Dispersive" material with 3 columns for "Sellmeier Equation" coefficients. Proceed to change the column size by double-clicking on the vertical column separator between columns. This action causes display of two more columns: "Ay(F/m)" and "Az(F/m)" which don't belong to **isotropic** settings

OP-297: Updates to DFT phase calculation for line and area detectors

The calculation of the imaginary part (affecting phase) of the discrete Fourier transform (DFT) calculation in OptiFDTD has been updated. The amplitude and power calculations/analysis remain unaffected.

BPM-50: Prompted to select a row for deleting a variable even if the row is already selected and highlighted.

Fixed. In the dialog "Variables and Functions", select a variable by clicking the row number. This row gets highlighted. Click any space below the last row. The selected row still remains highlighted. Click "Delete" button. A message "Please click a row number which you want to delete" will pop-up, even if the row is still highlighted (presumably selected).

OptiFDTD 13.0.2 Release Notes

05 Jan 2017

Minor Enhancements and Bug Fixes

OP-260: Display overlay objects contours to field graphs for 2D layout simulation result

Enhancement. The Object Overlay Contour display have been implemented for 3D simulation results. With this release update we have this feature for 2D Simulation results.. Now the "pure" 2D projects, where waveguide profiles have no 3D representation, can be visualized the same way as 3D simulation results.

OP-285: Wrong power spectrum graph for 2D pulse simulations

Fixed. The power spectrum values and the resulting graph for 2D pulse simulations are wrong in the following cases:

- Vertical Observation Lines - the Sx component(s) of Poynting Vector are checked.

- Horizontal Observation Lines - the Sx component(s) of Pointing Vector are un-checked.

OP-280: Incorrect shape discretization when sparse non-uniform mesh is used

Fixed. The material distribution for discretized shapes located in non-uniform mesh areas with lower mesh density than the regular mesh is incorrect.

Note: Only the projects with non-uniform mesh of lower density than the regular mesh were affected by this issue.

OP-279: Analyzer crashes when displaying Observation Area for projects without Input Plane

Fixed. Analyzer crashes when displaying simulation result for project designs which have no Input Plane, just Point Source, and Observation Area(s).

OP-281: Inconsistency between Height Plot and Image Map

Fixed. The waveguide overlay contours displayed on the Image Map is correct, however, when the display is switched to Height Plot the contour overlays are wrong.

OP-283: Missing PBG Cell Edit context menu

Fixed. The context menu (pop-up menu) for "turning on/off" PBG cell doesn't open.

OP-290: Toolbar buttons Re, Im, Amp disabled for H field component for 3D simulation results

Fixed. The Analyzer toolbar buttons used to change the displayed aspect of the (complex) optical field, the Re, Im, Amp, Pha, etc. are disabled for 3D simulation results, when H field component is displayed.

OptiFDTD 13.0.1 Release Notes

15 Aug 2016

Minor Enhancements and Bug Fixes

Relocated "Import 3D Shape..." menu option

The "Import 3D Shape..." menu option has been moved from "Draw" menu under "Draw->3D Shapes" sub-menu. This menu option can also be accessed from the Design Tutor menu set, under the "3D Shapes".

OP-274: Simulation 3D settings page doesn't remember time step size when non-uniform mesh is used

Fixed. Changes to time step size are not remembered in the "Simulation 3D Settings" window. Uncheck the "Auto" for time step size, and set a desired value. The value is properly propagated to the simulator, however, the value will be reset to the default value when the settings window is opened next time.

OP-275: Input Field Properties - unable to change between Power/Amplitude on 3D Gaussian Transverse tab

Fixed. Open the "3D Gaussian Transverse" tab in the "Input Field Properties" window. In the "Input Amplitude or Power" section select Amplitude, then Power radio button. Both options become active (checked) and there is no way of checking only one of them, until the window gets closed and opened again.

Mode-41: OptiMode Designer may crash when a project contains diffused waveguide profile or material

Fixed. OptiMode Designer may crash when opening a file project containing Diffused Waveguide Profile or Diffused Material.

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OP-278 Wrong field component labels for simulation results in Analyzer

Fixed. On the tabs displaying field components, Analyzer has wrong names: Hx, Ey, Hx for both TE and TM simulations, instead of Ex, Hy, Ez for TM and Hx, Ey, Hz for TE.

OptiFDTD 13.0 Release Notes

1 Jul 2016

Summary

In this major release of OptiFDTD we have introduced new graphical user interface improvements for the Designer, Simulator and Analyzer. The new interface simplifies the design process, simulation and analysis of complex devices. This release also includes the latest version of the Optiwave mode solver application, OptiMode version 4.0, which delivers the 64-bit Anisotropic Mode Solver and new Mode Measure calculations. For more details on OptiMode ver. 4.0 see "OptiMode Release Notes" document.

New features and enhancements

New Detector Analysis

The Detector Analysis tools have been redesigned to simplify and make access to the important information more convenient. The Detector Analysis functionality has been brought to the front of the Analyzer application. You can easily browse the Detectors within the project browser tree, view the graph or optical field for the selected detector in the application main window and have an overview of the related key data in the information pane, in which the user may observe parameter values (if any) associated with the project, e. g. parameter sweep. We have added a number of toolbars which provide fast access to the menu options, to control the displayed information.

Note: To help with the transition from the old UI to the new one, we still keep available the old "Detector Analysis" interface under Tool menu.

Import of 3D shapes into the Designer

With introduction of this feature, the users are no longer confined to the built-in 3D Editor and limited choice of 3D shape primitives. The users can use third party 3D CAD software of their choice, export the designed shapes into the generic (IGES) 3D file format, import it into the Designer and then configure for simulations. One can develop a number of independent, stand-alone objects, even a full layout, and import it into the Designer for simulations.

Dynamic optical field visualization during simulations

Typically, the FDTD simulations are like a "black box", once started the user has to wait until the simulation complete to observe the simulation progress (eg. movie) or the simulation results. With this release we have enabled the user to actually observe the optical field formation during the simulations. One can choose to visualize optical field forming within the Observation Areas and/or dynamically selected cuts across the simulation domain.

Shape cross-section outline over the optical field view.

In the Observation Area optical field view of OptiFDTD Analyzer, the user may choose to display outline overlay of the 3-dimensional shapes intersecting the Observation Area. This great visualization tool allows to observe the relation between the Layout shapes and formation of the optical field.

Simplified Waveguide Profile and Material management

We have removed the strong dependency on the old master.plb file, the former database of Waveguide Profiles and Materials. We have provided import/export functionality supported by XML defined file format. The user may import into a project (or export from it) a Profile and/or Material definition into an independent (XML) file. This allows materials and waveguide cross-sections to be easily defined, shared. Now, one can run OptiMode, OptiBPM, and OptiFDTD designers at the same time, as these applications are no longer locked out of the master.plb use.

Note: Access to master.plb is still available, so that users may export their Profiles and Materials. The support for master.plb will be phased out, eventually.

OptiMode XS Designer and Profile Designer Tutor pages

To make it easier for the users to find required information as to the OptiMode XS Designer and Profile Designer usage, we have added the "Design Tutor" menu. The Design Tutor shortly describes basic constructs and operational concepts for these applications.

Important Usage Notes

Input Field mode calculations in the Designer

The following applies when performing Input Field mode calculations for simulations:

- The whole wafer cross-section at the Input Plane location is send to the selected Mode Solver (Finite Difference or ADI). It includes cross-sections of all objects (waveguides and/or 3D objects) intersecting with the Input Plane.

- The mode solvers interpret each of the cross-sections as representing a straight waveguide, perpendicular to the Input Plane.

Note

There is no tilt angle applied on the solved modal field in simulators during the field injection, even if there is only a single waveguide intersecting with the Input Plane

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Legacy projects using VB Script to define Gaussian beam size (Half Width)

With the changes to the Gaussian beam size and Gaussian pulse parameter definitions (see the "***Minor Enhancements and Bug Fixes***" section below), the VB Script projects which define the Gaussian beam Half Width in the script code have to be modified to use the new interface functions. Running the simulations with the old VB Script code will abort on VB Script unsupported function call error.

The required VB Script changes

- The old (phased out) interface function **SetHalfWidth(***String* value)

- Has to be replaced with the function **SetWidth(***String value***)**

⚠️ **Important**

In order to get the same result, set the pulse width to be *2 * Sqr(2)* times larger than the former Half Width value.For example, if the half-width had been previously defined as 0.55 um, set the new value as follows:

InputPlane1.SetWidth *"0.55 * 2 * sqr(2)"*

See the "***Visual Basic Scripting Reference***" manual, chapter "VBScript Commands", under the "Input Plane Manager", page "Input Plane Object".

Minor Enhancements and Bug Fixes

OP-246 : Changes to the Gaussian pulse parameter and Gaussian beam size definitions

1. We have renamed the "Gaussian Modulated Continuous Wave" (GMCW) as "Sine-Modulated Gaussian Pulse" to bring it up to date with the commonly used terms in the FDTD simulation domain.

We have modified the "Sine-Modulated Gaussian Pulse" time domain parameter definitions as follow:

- The old "Time Offset" has been replaced with "Time Delay"

- The old "Half Width" definition (which was T - "standard deviation" of the Gaussian function) has been replaced with "FWHM" (Full Width at Half Maximum).

2. We changed the way the Gaussian Beam size is defined. The old Gaussian Transverse "Half Width" definition has been replaced with

		Width at 1 e 2 (* maximum Intensity value) Width at 1e2(* maximum Intensity value)		

The relation between the old "Half Width" and the current Beam Size definitions is:

		"Width at 1 e 2 "=22 T "Width at 1e2"=22 T	

See the ***Technical Background***, the "Light Sources" chapter for details.

OP-91 : Re-introduce ADI Mode Solver to Input Field Properties

On the popular demand we have re-introduced ADI Mode Solver to Input Field's Mode Solver choice options.

OP-154 : Sporadic crashes when observing Refractive Index distribution in Designer

Fixed. On some project, switching between the 3D Refractive Index tab and 2D Refractive Index tab while changing observed (XY/XZ) direction used to crash the application.

OP-145 : "run until user stops execution, ..." broken when a point detector is present

Fixed. Whenever a point detector is present in the layout, when using the "run until user stops..." in the simulator options, the simulator stops right at the start..

OP-261 : The default values of time offset and half width are not updated after editing the wavelength

Fixed. The Point Source property settings. The default "Time Offset" and "Half Width" values on "Gaussian Modulated Continuous Wave" setting page were not being updated when the user changed wavelength on "General" settings page.

BZ-4248 : Special characters in object names may result in unexpected behavior

Fixed. When special characters (such as '=') are used in observation lines or other scriptable object names, the script interpreter will misinterpret the characters, resulting in unexpected behavior. Please refrain from using special characters in object names. For example, use '_' instead of '='.

Known issues

OP-245 : Perfect Conductor should not be available for Wafer settings.

In a project which contains the Perfect Conductor material, open Wafer Properties (from the Edit menu or double-click on "Simulation Domain" in the project browser tree). The user may choose Cladding and/or Substrate material (ie. background material) from the combo-box. The Perfect Conductor material is available as one of the options, even if it is not suitable for this purpose.

This issue will be fixed in the future release.

OP-222 : The waveguide object contour outline not visible for 2D simulation results of some projects.

If a project designed for 2D simulations contains waveguide objects without defined 3D representation (missing 3D cross-section, 3D Waveguide Profile definition), then the Analzyer will not be able to show the object contour outlines, since these are generated for 3D shapes.

In a similar way, Analyzer may incorrectly show waveguide outlines for 2D simulation result, for the waveguides which Channel Waveguide profile contains layers with an offset. The outlines are correclty calculated for the 3D cross-section ie. layers with an offset, however, they do not match the 2D Layout view.

This issue will be fixed in one of the future releases.

OP-53 : Issues with runing simulations on Japanese and Korean locales.

When the project files designated for simulations are stored in a folder which contain non-ASCII (UNICODE) characters, the simulations may abort. The same may happen when the project name contains non-ASCI (UNICODE) characters.

Workaround: Try to copy the project file to the root of the hard disk (eg. C:) or create a C:\tmp\ folder and copy the project file into this folder.

OP-243 : Double-click doesn't open PWE Band Solver (.pnd) files

The PWE Band Solver Simulator generates .pnd result file and allows to immediately analyze it. However, double-clicking on the .pnd result file will not open the PWE Band Solver for result analysis.

Wokaround: Start the PWE Band Solver application, first. The file can be opened for analysis from within the PWE Band Solver.

BZ-4281 : User-defined parameters impossible to delete

In some cases, user-defined parameters might be impossible to delete after they have been used in the Parameter Sweep window. Furthermore, if a parameter is used in an expression, deleting it will result in the expression being replaced by the last known value of the parameter.

OP-19 : The simulation window opens in front of any other window at each iteration of a parameter sweep

When running parameter sweeps, the simulation progress window goes on top of all other open windows. Even if the user changes to another window, the window will come back on top at each iteration.

OP-27 : Total Field / Scattered Field unavailable in 64-bit OptiFDTD

TFSF sources are not available in this version of OptiFDTD. This issue will be solved in a future release. Please use OptiFDTD 32-bit for your TFSF analysis needs in the meantime.

Installation notes

Intel Redistributables installation

As part of the installation process, Intel redistributables are installed alongside with OptiFDTD and (optionally) OptiFDTD samples. Please note that a reboot of the computer is required after installation for OptiFDTD to function properly.